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SMART WEIGHING SOLUTIONS



1203 Weight Transmitter Reference Manual

For use with Software Versions 1.0 and above

1203-600-180

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"Everything should be made as simple as possible, but not simpler."

- Albert Einstein -

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Table of Contents

1. INTRODUCTION 5
1.1. Document Conventions 5
2. SPECIFICATIONS 6
3. INSTALLATION 7
3.1. Introduction 7
3.2. Power Supply 7
3.3. Load Cell Signals and Scale Build 7
3.4. Cable Shield Connection and Earthing 7
3.5. Load Cell Connection 8
3.5.1. 6-Wire Connection 8
3.5.2. 4-Wire Connections 9
3.6. Intrinsic Safety 10
3.7. Serial Communication Ports 10
3.7.1. Serial 1: RS-232 Port 11
3.7.2. Serial 2: RS-485 Port 11
3.7.3. Multi-Drop Networking 12
3.7.4. RS-232 Connection 12
3.7.5. RS-485 Connection 13
3.8. Input / Output: Setpoints 14
3.9. Input / Output: Inputs 15
3.10. Analog Output 16
3.11. Light Emitting Diode (LED) 16
3.12. 1203 Viewer Software 16
4. CONTROLS 17
5. DIGITAL SETUP 18
5.1. Introduction 18
5.2. Basic Weighing Terminology 18
5.3. Direct mV/V Operation 19
5.4. Filtering Techniques 19
5.4.1. FIR Filter 19
5.4.2. Digital Averaging 19
6. CALIBRATION 20
6.1. Introduction 20
6.2. Digital Calibration with Test Weights 20
6.2.1. Digital Zero Calibration Routine 20
6.2.2. Digital Span Calibration Routine 20
6.3. Digital Direct mV/V Calibration 21
6.3.1. Digital Zero Calibration Routine 21
6.3.2. Digital Span Calibration Routine 21
6.4. Analog Output Calibration 21
6.4.1. Analog Calibration Routine 21
7. SERIAL OUTPUTS 22
7.1. Introduction 22
7.2. Automatic Weight Output 22
7.3. Networking the 1203 22
7.3.1. RS-485 Termination Resistors 22
8. EXTENDED FUNCTIONS 23
8.1. Setpoints 23
8.1.1. Introduction 23
8.1.2. Status Indication 23
8.1.3. Connection 23
8.1.4. Operation 23
8.1.5. Example 1: Control Level of Product in 2000kg Tank 24
8.1.6. Example 2: Control Weighing of Product Out of Silo into 100kg Drums 24

8.2. Remote Input 24
9. OPTIONS 25
9.1. Display/Keys 25
9.1.1. Installation 25
9.1.2. Setup and Calibration 25
10. COMMANDS 26
10.1. Overview 26
10.1.1. Commands and Queries 26
10.1.2. Responses 26
10.1.3. Parameters 26
10.1.4. Termination 26
10.2. Command Details 27
10.2.1. ACL: Set Automatic Temperature Calibration On/Off 27
10.2.2. ADR: Set Address 28
10.2.3. ANL: Set Analog Output 29
10.2.4. ANM: Set Analog Output Maximum and Minimum 30
10.2.5. ASF: Set Filtering 31
10.2.6. BDR: Set Baud Rate 32
10.2.7. COF: Set Output Format 33
10.2.8. ESR: Query Error Status 36
10.2.9. FCN: Execute A Function 37
10.2.10. HYS: Set Hysteresis 38
10.2.11. IAD: Set Scale Build 39
10.2.12. IDN: Set Identification 40
10.2.13. LDW: Calibrate Zero Dead Weight 41
10.2.14. LIV: Set Limit Value 42
10.2.15. LWT: Calibrate Span 43
10.2.16. MSV?: Query Measured Weight Value 44
10.2.17. RBT: Remote Button Settings 45
10.2.18. RES: Reset 47
10.2.19. SER: Set Serial Communications Settings 48
10.2.20. STP: Stop Continuous Transfer 49
10.2.21. Sxx: Select Unit 50
10.2.22. TAR: Tare 51
10.2.23. TDD: Load/Save Setup 52
11. APPENDIX 53
11.1. Glossary of Terms 53
11.2. List of Figures and Tables 53
12. INDEX 54

1. Introduction

The **1203** is a precision digital weight transmitter using the latest Sigma-Delta A/D converter to ensure extremely fast and accurate weight readings.

The setup and calibration are digital, with a non-volatile security store. All setup parameters and important operating settings (Zero / Tare, etc.), are retained when power is removed.

The **1203** can output both 4-20mA and 0-10V analog. These outputs can be calibrated by the user to output any range.

The instrument has two trip points with output drive and status display via LEDs.

The **1203** provides two serial outputs. These allow communication with external computers, PLCs and remote displays. Serial 1 provides RS-232 while Serial 2 provides 4-wire RS-485.

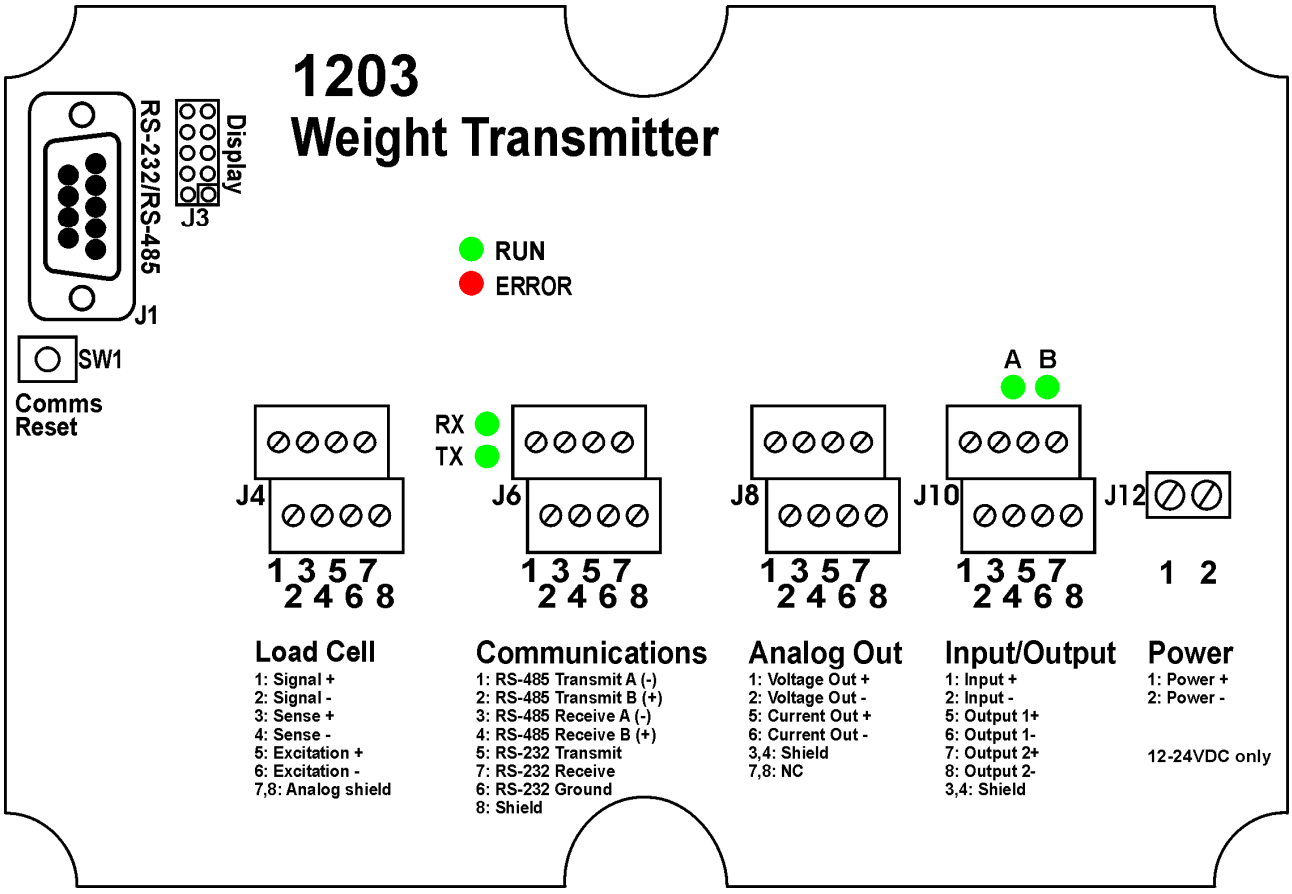


Figure 1: 1203 Weight Transmitter

1.1. Document Conventions

The following conventions (typographical) are used throughout this Reference Manual.

Bold Text	Bold text denotes words and phrases to note.
^	This symbol denotes one space (used in **1203** Commands)
…	Ellipses indicate an incomplete listing. For space considerations in this Reference Manual complete listings of returned Command responses may not be shown.

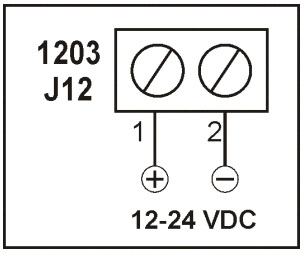
2. Specifications

General	
Operating Environment	Temperature: –10 to +50°C ambient, Humidity: <90% non-condensing
Power Supply	12VDC at 500mA max to 24VDC at 250mA max
Instrument Variations	
1203 Weight Transmitter	Enclosure Class: IP55+/NEMA Enclosure Material: Aluminium Dimensions: 170 x 120 x 55 or 170 x 145 x 55 including cable gland P/No: 1203
1203 Weight Transmitter with Display	Enclosure Class: IP55+/NEMA Enclosure Material: Aluminium Dimensions: 170 x 120 x 55 or 170 x 145 x 55 including cable gland Window: Acrylic/polycarbonate (Not for use in full sun). P/No: 1203/D
1203 Weight Transmitter - PCB Only	P/No: 1203/B
Analog Input	
Stability/Drift	Zero: <0.1μV/°C, Span: <10ppm/°C, Linearity: <20ppm, Noise: <0.05μVp-p
Span Adjustment	0.1mV/V to 3mV/V capacity
Calibration	Digital, Non-Volatile
Digital Filter	Averaging 1, 2, 4, 8, 16, 32, 64, 128 or 256 readings (10ms to 2.56s)
A/D Converter	Type: 24bit Sigma Delta Resolution: 8,388,608 internal counts
Load Cells	Excitation: 8VDC Connection: 6-wire + shield Available Excitation Current: 150mA (6 x 350Ω load cells)
Sampling Rate	100Hz
Analog Output	
Type	Configurable (4-20mA, 0-24mA, 0-20mA, –10-10V, 0-10V, 2-10V, 0-5V, 1-5V, etc)
Overall Error	<0.1%
Isolation	>500V
Impedance	Maximum current-loop impedance: 1000Ω Minimum impedance between voltage outputs: 2000Ω
Update Rate	100Hz (50Hz when scaled to user calibration)
Communications	
Serial Output	RS-485 full duplex and RS-232 full duplex
Capability	Automatic transmit and network
Network Protocol	HBM AED/WE2110
Input / Output	
Isolated Input	Number of isolated inputs: 1
Input Voltage Range	Active input voltage range: 5-28VDC
Input Current Requirements	1.5mA at 5VDC to 13mA at 28VDC
Transistor Output	Number of isolated transistor outputs: 2
Load Output	Maximum load on output: 300mA
Voltage Output	Maximum operating voltage on output: 30VDC
Output Protection	Reverse and short-circuit protected
Output Update Rate	100Hz (50Hz when scaled to user calibration)
Options	
1203 Display Service Tool	6 LED digits 14mm high with 4 Annunciators, 4 Units and 4 Buttons P/No: 1203/S
1203 Viewer Package	Viewer software, RS-232 cable and Reference Manual. P/No: 1203/V
Other	
Calibration	Transferable calibration
Safety Standards	C-tick approved. CE approved. UL approval pending.

3. Installation

3.1. Introduction

The **1203** must not be subject to shock, excessive vibration, or extremes of temperature, either before or after installation.



The inputs of the **1203** are protected against electrical interference, but excessive levels of electro-magnetic radiation and RFI may affect the accuracy and stability of the instrument. The **1203** should be installed away from any sources of electrical noise. The load cell cable is particularly sensitive to electrical noise and should be located well away from any power or switching circuits.

Figure 2: Power Supply

3.2. Power Supply

The power supply is connected using the power connector (J12). The DC supply need not be regulated, provided that it is free of excessive electrical noise and sudden transients. The **1203** can be operated from a high quality plug-pack as long as there is sufficient capacity to drive both it and the load cells.

The unit is constructed to use 12-24 VDC only. Voltages outside this range may cause improper operation or damage.

3.3. Load Cell Signals and Scale Build

Very low output scale bases can be used with the **1203** but may induce some instability in the weight readings when used with higher resolutions. Generally speaking, the higher the output, or the lower the number of divisions, the greater the display stability and accuracy.

The **1203** has a millivolt-per-volt reading available which can be used to check scale base signal output levels.

IMPORTANT NOTICE

3.4. Cable Shield Connection and Earthing

- Care should be taken when connecting shields to maximise EMC immunity and minimise earth loops and cross-talk (interference) between instruments.
- For EMC immunity, termination of the load cell shield at the **1203** end is important (ie. with connection to the **1203** case via the shield connection).
- **1203** enclosure is directly connected to the shield connections on the terminal blocks.
- **1203** should be connected to earth via a single reliable link to avoid earth loops.
- Where each instrument is separately earthed, interconnecting cable shields should be connected at one end only.
- Caution: Some load cells connect the cable shield directly to the load cell (and therefore the scale base). Connection of the shield in this situation may be site specific.
- Unit complies with relevant EMC standards provided case ground connection is correctly made. Resistance measured between **1203** case and nearest earth point should be less than 2 ohms.

3.5. Load Cell Connection

The following provides information on 6-wire and 4-wire connections.

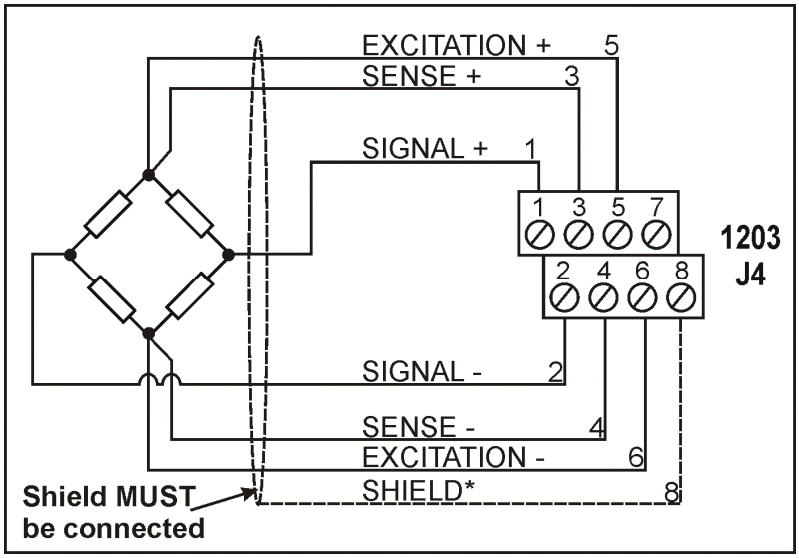
3.5.1. 6-Wire Connection

When wiring load cells, use only high quality shielded multi-core cable. The cable should be run as far away from any other cabling as possible (minimum separation distance 150mm). Do not bundle load cell cables with power or control-switching cables as interference can trigger display instability, and cause unreliable operation.

The connection is made using the load cell connector (J4). The load cell is wired for a 6-wire system as follows:

Terminal	Function
1	Positive Signal
2	Negative Signal
3	Positive Sense
4	Negative Sense
5	Positive Excitation
6	Negative Excitation
7,8	Shield

Table 1: 6-Wire Connections



*For more information on shielding refer to page 7.

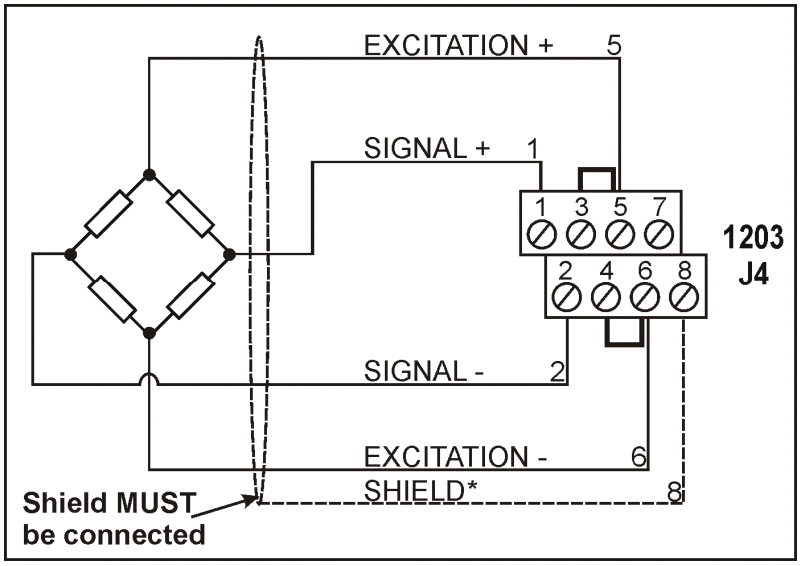
Figure 3: Load Cell: 6-Wire Connections

Note: Sense lines MUST be connected.

3.5.2. 4-Wire Connections

The **1203** is not fitted with auto-sensing of the load cell excitation. This is intentional on this unit to optimise the performance across all applications, including those involving intrinsic safety barriers.

When a 4-wire load cell system is connected, terminals 3 & 5 and 4 & 6 must be joined by wire bridge. This is to ensure that the excitation voltages are fed into the sense inputs (terminals 3 & 4). Failure to do this will result in the **1203** displaying the error code E0040 and/or E0080. Refer to Error Codes page 36 for more information. The unit will not operate correctly if the sense wire bridges are not connected.



*For more information on shielding refer to page 7.

Figure 4: Load Cell: 4-Wire Connections

3.6. Intrinsic Safety

The **1203** has been designed to operate in installations with intrinsic safety barriers down to Class 1, Zone 1. The following diagram shows a suggested method of installing the **1203** with safety barriers for up to four load cells.

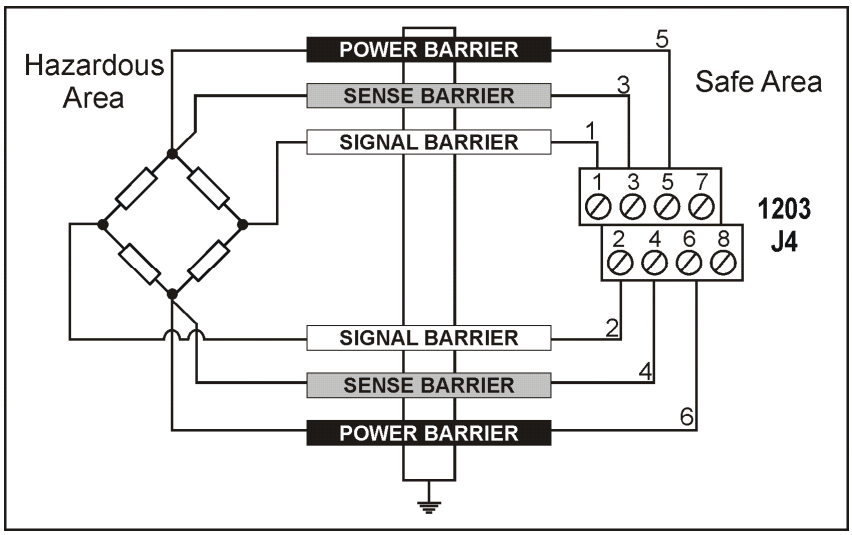


Figure 5: Sample Installation Method - 1203 with Safety Barriers

Note: As the regulations concerning intrinsic safety can vary from country to country, consult local regulations before attempting such an installation. **Special attention should be paid to the grounding of the 1203 and the barrier system.**

3.7. Serial Communication Ports

There are two serial communication ports on the **1203**.

- Serial 1 is a full duplex RS-232 connection.
- Serial 2 is a full duplex, 4-wire RS-485 connection.

Both ports can be used as network or automatic output ports. The two ports can be connected using the communications connector (J6) or using the DB9 connector (J1). The DB9 is primarily intended for use as a short-term configuration and diagnostic connection.

The serial ports on the **1203** are not completely independent. Commands cannot be sent to the **1203** on both ports simultaneously. Also, the **1203** cannot identify which port received the command so all replies are sent to the configured network port(s).

The serial ports are configured using the **SER** and **BDR** commands. The Comms Reset switch (SW1) sets the serial ports to a known state. For versions 1.6 and below, this state will become permanent when a save is performed. For versions 1.7 and above, this state (viewer mode) is temporary and another press will return the **1203** to normal operation.



Comms Reset

Short Press (< 2 seconds)
Will Set:

- Comms to 9600n81
- RS-232 to Network
- RS-485 to OFF

Long Press (>= 2 seconds)
Will Set:

- Comms to 9600n81
- RS-232 to OFF
- RS-485 to Network

Figure 6: Comms Reset Switch (SW1)

3.7.1. Serial 1: RS-232 Port

All connections for this port are on the communications connector (J6) and on the DB9 connector (J1).

Note: Terminals 5 to 7 of the communications connector (J6) are connected directly to pins 2, 3 and 5 of the DB9 connector (J1). This provides for quick and convenient connection of test or debug systems.

The connections for the outputs are shown below:

J1 Pin No	J6 Terminal No	Function	Description	Connect to
2	7	RXD	RS-232 Receive Line	External Device Transmitter (Usually Pin 3)
3	5	TXD	RS-232 Transmit Line	External Device Receiver (Usually Pin 2)
5	6	GND	RS-232 Digital Ground	External Device Digital Ground (Usually Pin 5)
Backshell	8	Shield		Cable Shield

Table 2: Serial 1: RS-232 Port - Connection Outputs

3.7.2. Serial 2: RS-485 Port

All connections for this port are on the communications connector (J6) and on the DB9 connector (J1).

Note 1: The **1203** supports 4-wire full duplex RS-485 only (ie. 2-wire half-duplex communications are not supported).

Note 2: Terminals 1 to 4 of the communications connector (J6) are connected directly to pins 6 to 9 of the DB9 connector (J1) - (J6.1-J1.9, J6.2-J1.8, J6.3-J1.7, J6.4-J1.6). This provides for quick and convenient connection of test or debug systems.

J1 Pin No	J6 Terminal No	Function	Description	Connect To
7	3	RA(-)	RS-485 Receive A (-)	External Network
6	4	RB(+)	RS-485 Receive B (+)	External Network
9	1	TA(-)	RS-485 Transmit A (-)	External Network
8	2	TB(+)	RS-485 Transmit B (+)	External Network
Backshell	8	Shield		Cable Shield

Table 3: Serial 2: RS-485 Port - Connection Outputs

3.7.3. Multi-Drop Networking

The following table shows how to connect a number of instruments in an RS-485 4-wire multi-drop network:

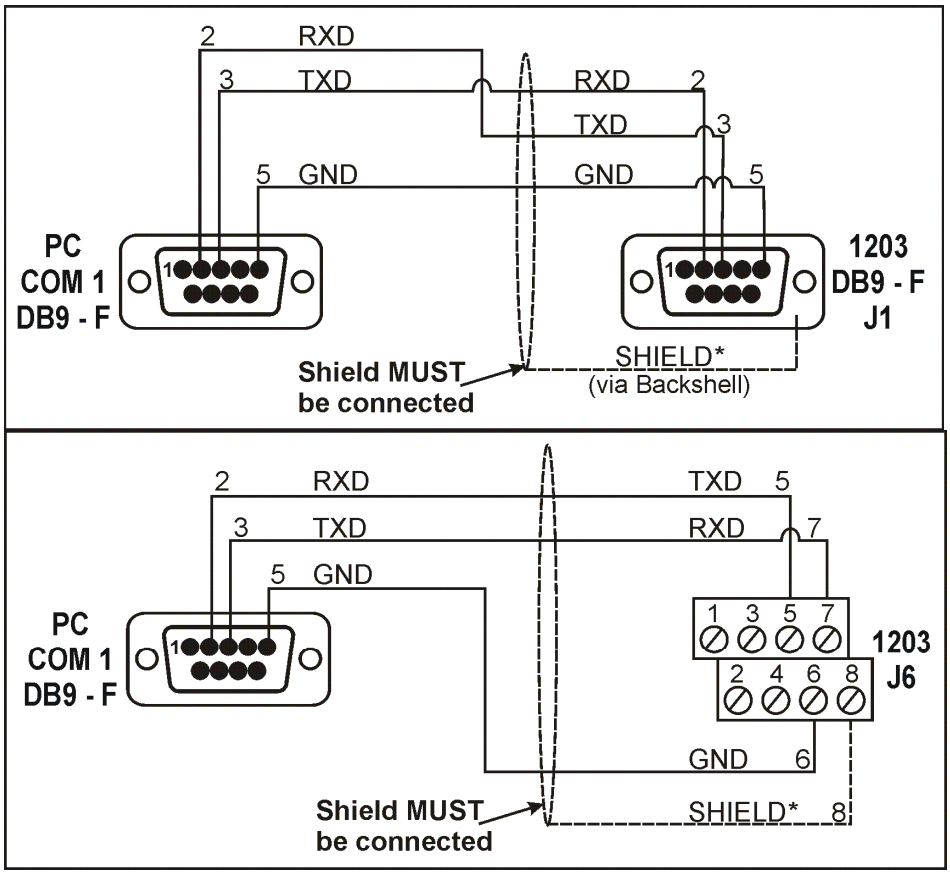
Cable 1			Cable 2			
Network Master	**1203 - Unit 1**		**1203 - Unit 1**		**1203 - Unit 2**	
Function	Function	Terminal (J6)	Function	Terminal (J6)	Function	Terminal (J6)
RA(-)	TA(-)	1	TA(-)	1	TA(-)	1
RB(+)	TB(+)	2	TB(+)	2	TB(+)	2
TA(-)	RA(-)	3	RA(-)	3	RA(-)	3
TB(+)	RB(+)	4	RB(+)	4	RB(+)	4

Table 4: Multi-Drop Networking Connections

Note: For more than two units, duplicate Cable 2 between each new unit and the network.

The end devices in a multi-drop RS-485 network may need to be provided with termination resistors to balance the network loadings. These resistors are built into the **1203** and they can be enabled or disabled using the digital setup. Refer to BDR: Set Baud Rate page 32 for more information.

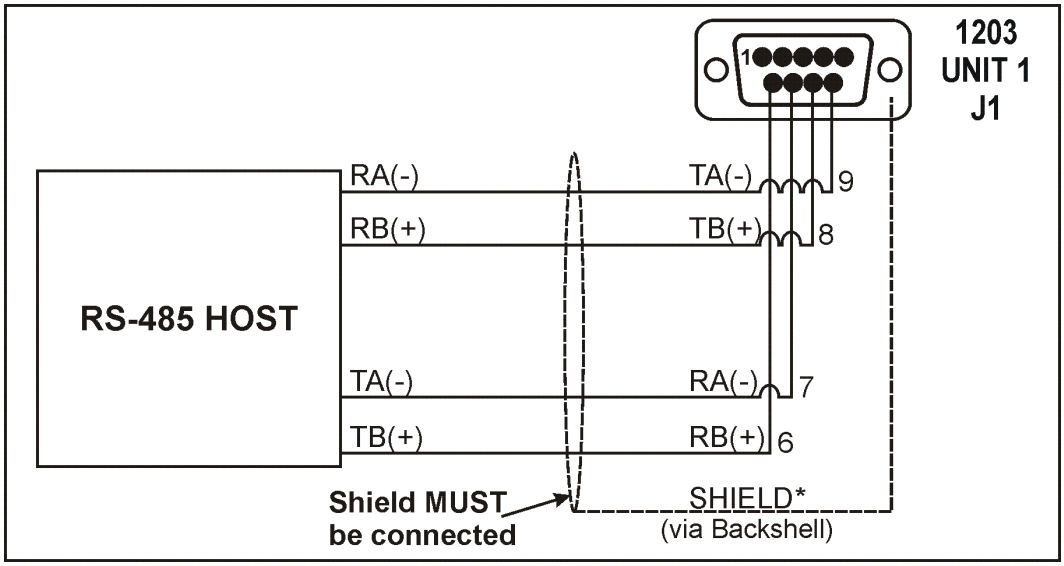
3.7.4. RS-232 Connection

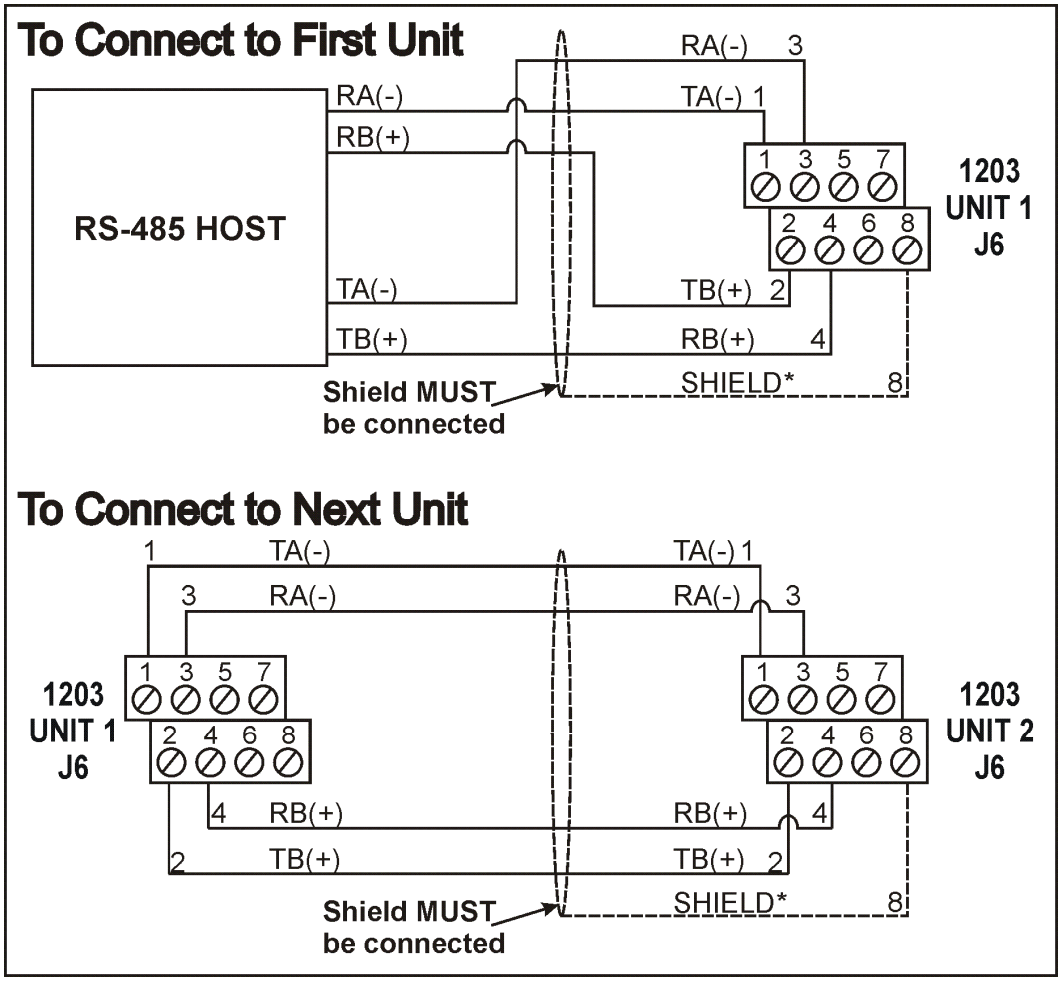


*For more information on shielding refer to page 7.

Figure 7: RS-232 Connection (J1) & (J6)

3.7.5. RS-485 Connection





*For more information on shielding refer to page 7.

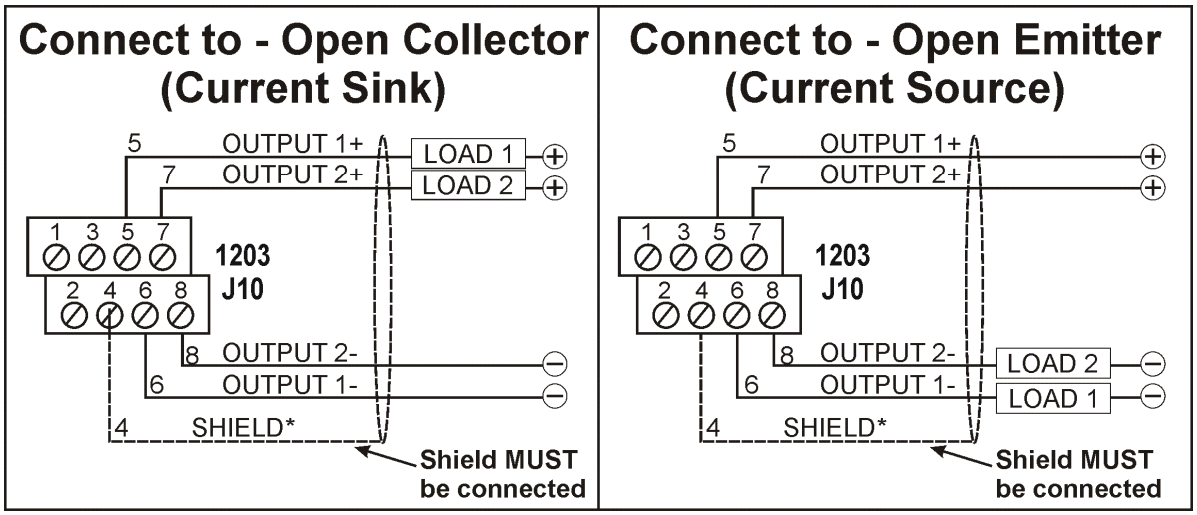
Figure 8: RS-485 Connection (J1) & (J6)

3.8. Input / Output: Setpoints

The **1203** has two setpoint outputs. The setpoints are configured using the **LIV** and **HYS** commands. For Specifications refer to page 6.

The connections for these outputs are available on J10 as follows:

Terminal	Function	Connect To - Open Collector (Current Sink)	Connect To - Open Emitter (Current Source)
5	Output 1+	External Load 1-	Power Supply +
6	Output 1-	Power Supply -	External Load 1+
7	Output 2+	External Load 2-	Power Supply +
8	Output 2-	Power Supply -	External Load 2+



*For more information on shielding refer to page 7.

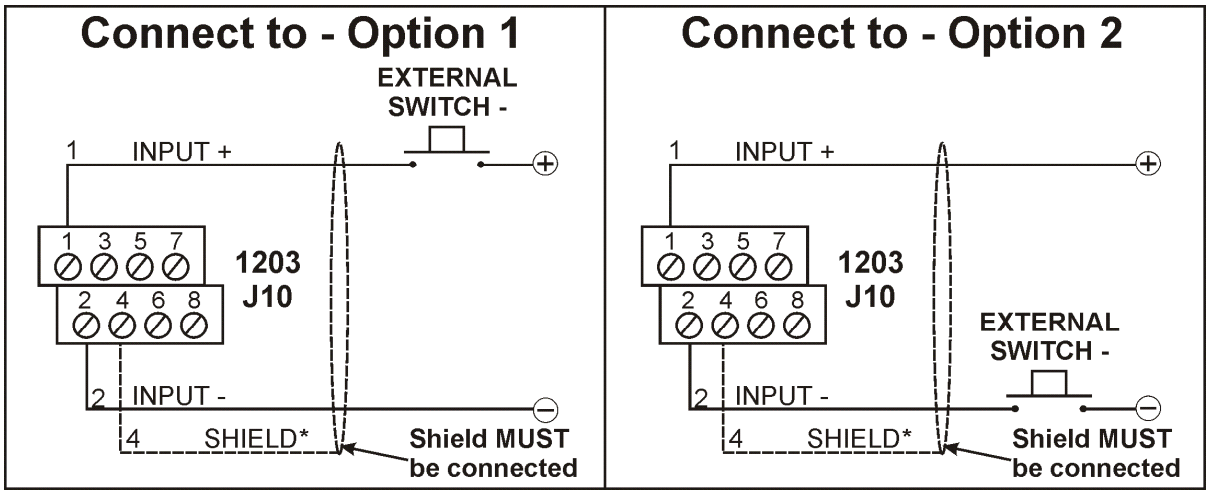
Figure 9: Input / Output - Setpoints (J10)

3.9. Input / Output: Inputs

The **1203** has one digital input. This input is configured using the **RBT** command. For Specifications refer to page 6.

The connections are available on J10 as follows:

Terminal	Function	Connect To - Option 1	Connect To - Option 2
1	Input +	External Switch -	Power Supply +
2	Input -	Power Supply -	External Switch +



*For more information on shielding refer to page 7.

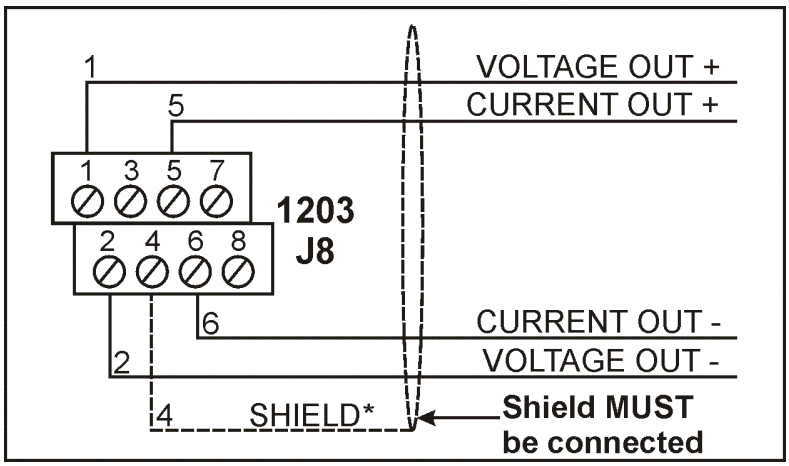
Figure 10: Input / Output: Inputs (J10)

3.10. Analog Output

The analog output is connected using the analog out connector (J8). The **1203** has one analog output. This output can be either voltage or current. It is configurable within the limits of –10 to 10V or 0 to 24mA. The default is 0-10V or 4-20mA. The output is configured using the **ANL** and **ANM** commands.

The connections are available on J8 as follows:

Terminal	Function	Connect To
1	Voltage +	External Load +
2	Voltage -	External Load -
5	Current +	External Load +
6	Current -	External Load -



*For more information on shielding refer to page 7.

Figure 11: Analog Out Connections

3.11. Light Emitting Diode (LED)

The flashing **green** LED indicates the **1203** is On.

The **green** LED **On but not flashing** indicates that the **1203** is still starting or that the **1203** is in viewer mode.

The flashing **red** LED indicates the **1203** is experiencing an error. The **ESR** command is used to query the error status of the instrument. Refer to ESR: Query Error Status page 36 for more information.

3.12. 1203 Viewer Software

The **1203** Viewer Software can be used in the setup of the instrument. The Viewer Software is available by contacting Rinstrum or from the web site at www.rinstrum.com.

4. Controls

The **1203** controls consist of a single button (SW1). The function of this button depends on the **1203** software version:

- For versions 1.6 and below, this button resets the communications to the following settings:

Control	Setting
Baud	9600
Parity	None
Data Bits	8
Stop Bits	1

  - A short press of the SW1 button (50ms < t < 2s) sets the RS-232 port in network mode and disables the RS-485 port.
  - A long press of the SW1 button (t >= 2s) sets the RS-485 port in network mode and disables the RS-232 port.

  Note: These new settings will become permanent if a save is performed.

- For versions 1.7 and above, this button sets the **1203** in Viewer Mode. Viewer mode is not permanent and another press of the button will exit this mode. While in viewer mode, the **1203** communications are set to the following settings regardless of what is configured:

Control	Setting
Baud	9600
Parity	None
Data Bits	8
Stop Bits	1

  - A short press of the SW1 button (50ms < t < 2s) sets the RS-232 port in network mode and disables the RS-485 port.
  - A long press of the SW1 button (t >= 2s) sets the RS-485 port in network mode and disables the RS-232 port.

5. Digital Setup

5.1. Introduction

Digital setup of the **1203** can be carried out using the serial communications links or by using the **1203/S Service Tool** (Display/Keys). For more information on the optional display refer to the 1203 Display Manual.

There is no password to secure setup and calibration via the serial communications link.

5.2. Basic Weighing Terminology

The following terms are used throughout the setup procedure. Knowledge of these basic weighing terms is beneficial in setting up and calibrating the **1203**.

Note: Detailed descriptions of these and other terms used in this Reference Manual are described in the Glossary of Terms page 53.

Term	Definition
Units	Units of measurement (kilograms, tonnes, pounds, etc.).
Capacity	Maximum gross weight allowed on the scale.
Resolution or Count-by	Smallest change in weight units that the display can show.
Graduations	Maximum number of display steps between zero gross load and full capacity gross load.
Division	A single graduation.

Example

A 10,000kg 2.0mV/V load cell is used in an application with a 5000kg range, displaying in 5kg divisions.

The values of each of the above terms are:

- Units = kg
- Capacity = 5000
- Count-by = 5
- Graduations = 1000

The Signal Voltages are:

- The capacity load cell signal is (5,000 / 10,000) x 2.0mV/V = 1.0mV/V.
- Since the **1203** uses 8V excitation, the absolute signal voltage is 8 x 1.0 = 8.0mV.

The Signal Resolution is therefore:

- 8.0 / 1000 = 0.008mV / division or 8μV / division.

5.3. Direct mV/V Operation

If the output capacity of the load cell is known, the **1203** can be calibrated without test weights. This is useful for applications where it is impractical to use test weights (eg. silo weighing).

This mode of operation allows the following signal strengths to be entered directly:

- mV/V (at no load)
- mV/V (of the span)

This type of calibration is only as accurate as the load cell output figures. For many applications this is more than adequate. Refer to Calibration page 20 for more information.

5.4. Filtering Techniques

The **1203** has filtering options available which allow it to be optimised to produce the most accurate readings possible in the shortest time. There is a trade-off between noise filtering and the step-response time of the system. The filtering options define the amount of time required to determine a final weight reading (not the number of readings per second that are produced).

5.4.1. FIR Filter

The first level of filtering is the FIR filter. This is linked to the measurement rate. The measurement rate is fixed at 100Hz. This filter is a very high performance "tuned" filter that provides up to 180 dB of attenuation at multiples of the SYNC frequency. It also provides broadband filtering of between approximately 40 and 80 dB.

5.4.2. Digital Averaging

The second level of filtering is the digital averaging. Digital averaging is implemented as a fixed length sliding window average where the average of the last "**n**" readings is calculated. As each new reading is taken the oldest reading is discarded and a new average is calculated. The length of the window is set with the **ASF** command using from 1 to 256 readings. Each reading in the average adds a delay to the step-response equal to the measurement period.

Example

An average of 10 readings results in a total step-response of (10 + 3) * 10 = 130 milliseconds (where 3 samples is the fixed delay added by the FIR filter).

6. Calibration

6.1. Introduction

The calibration of the **1203** is fully digital and can be carried out using the serial communications links or by using the **1203/S Service Tool** (Display/Keys). The calibration results are stored in permanent memory for use each time the unit is powered up.

The **1203** uses the following three digital calibrations simultaneously.

Calibration	Changeable	Details
Raw	No	This calibration is fixed.
mV/V	No	This calibration is fixed.
User	Yes	This calibration can be changed. Performing a User Calibration is not a requirement however, as the factory calibration is complete. If a User Calibration is to be performed, the **IAD**, **ANL**, **ANM**, **LDW** and **LWT** commands are used. Refer to Commands page 26 for more information. **Note: It is important to perform the zero calibration before the span calibration.**

6.2. Digital Calibration with Test Weights

6.2.1. Digital Zero Calibration Routine

- Remove all weight from the scale structure.
- Send the **LDW** command to the instrument. To get very accurate data, the instrument increases the averaging for this step and will require 3 to 4 seconds to complete. While calibrating, the response to any command will be **1**. For example, **LDW?** will return **1** while calibrating followed by **x** (where **x** is the zero value in mV/V), when calibration is completed.
- When the calibration is complete send the **TDD1** command to save the calibration to EEPROM.

6.2.2. Digital Span Calibration Routine

- Add the calibration test mass to the scale. A small weight (eg. <5% load cell capacity) may limit calibration accuracy. The closer the test weight is to full user range, the better the accuracy.
- Use the **IAD** command to setup scale build information.
- Send the **LWT** command with the test weight in user value without decimal points. For example, send **LWT1000** for a calibration of 300kg (capacity) in 0.1kg graduations (3000 graduations total) and a test weight of 100kg. To get very accurate data, the instrument increases the averaging for this step and will require 3 to 4 seconds to complete. While calibrating, the response to any command will be **1**. For example, **LDW?** will return **1** while calibrating followed by **x** (where **x** is the zero value in mV/V), when calibration is completed.
- When the calibration is complete send the **TDD1** command to save the calibration to EEPROM.

6.3. Digital Direct mV/V Calibration

6.3.1. Digital Zero Calibration Routine

• Remove all weight from the scale structure.
• Use the **LDW** command to specify the zero value. Refer LDW: Calibrate Zero Dead Weight page 41 for more information.
• When the calibration is complete send the **TDD1** command to save the calibration to EEPROM.

6.3.2. Digital Span Calibration Routine

• Use the **IAD** command to setup scale build information.
• Send the **LWT** command with the test weight in user value without decimal points and the corresponding signal value. Refer to LWT: Calibrate Span page 43 for more information.
• When the calibration is complete send the **TDD1** command to save the calibration to EEPROM.

6.4. Analog Output Calibration

Analog outputs are, by default, in current mode. The readings will be as follows:

- 0mV/V: 4mA
- 3mV/V: 20mA

These points can be altered via a calibration procedure using the **ANL** command. Refer to ANL: Set Analog Out page 29 for more information.

6.4.1. Analog Calibration Routine

• Choose the data type (current or voltage) and choose the data source for the output. Refer to ANL: Set Analog Out page 29 for more information.
• Calculate the zero and span values. The zero and span values are set in the data type chosen in the previous step. The zero value is the value (in the chosen data source units) at 4mA or 0V output. The span value is the value (in the chosen data source units) at 20mA or 10V output.
• Write the type, data source, zero and span values using the **ANL** command.
• If necessary, use the **ANM** command to limit the output current or voltage to a part of the possible range.
• When the calibration is complete send the **TDD1** command to save the calibration to EEPROM.

7. Serial Outputs

7.1. Introduction

The **1203** provides serial output options allowing communications with external devices such as computers, PLCs or remote displays.

The following serial outputs are available:

- Serial Port 1 is bi-directional RS-232 and can be set for driving automatic weight output, or networking.
- Serial Port 2 is bi-directional RS-485 and can be set for driving automatic weight output, or networking.

These options are set using the **SER** command. The baud rate and bit pattern of the serial data can also be set using the **BDR** command.

Computer communications can be configured for simple automatic "streamed" output through to multi-drop networked systems. The **1203** is programmed and calibrated via the network.

7.2. Automatic Weight Output

The automatic weight output is normally used to drive a dedicated computer, remote displays or PLC communications. The output generates a simple weight message at intervals programmed in the digital setup.

The **SER** command is used to enable automatic output.

7.3. Networking the 1203

The standard **1203** protocol supports networking. The network language allows for full control over all functions of the instrument. Refer to Commands page 26 for more information.

7.3.1. RS-485 Termination Resistors

The termination resistors required by RS-485 networks are built into the **1203**. The resistors are used to terminate the ends of the network to provide a balanced loading.

The termination resistors in the **1203** are enabled using the **BDR** command.

8. Extended Functions

8.1. Setpoints

8.1.1. Introduction

The **1203** is fitted with two built-in setpoints with output drivers.

Each of the setpoints provides a simple comparator function that can be modified using the **LIV**, **HYS** and **FCN** commands. Target weight, switching direction, hysteresis and logic can be configured. Outputs can be forced ON or OFF using the **FCN** command (or the external input).

8.1.2. Status Indication

The status of the setpoints is displayed using LEDs near the connectors.

8.1.3. Connection

Refer to Installation page 7.

8.1.4. Operation

The following figure illustrates the operation of active weight setpoints.

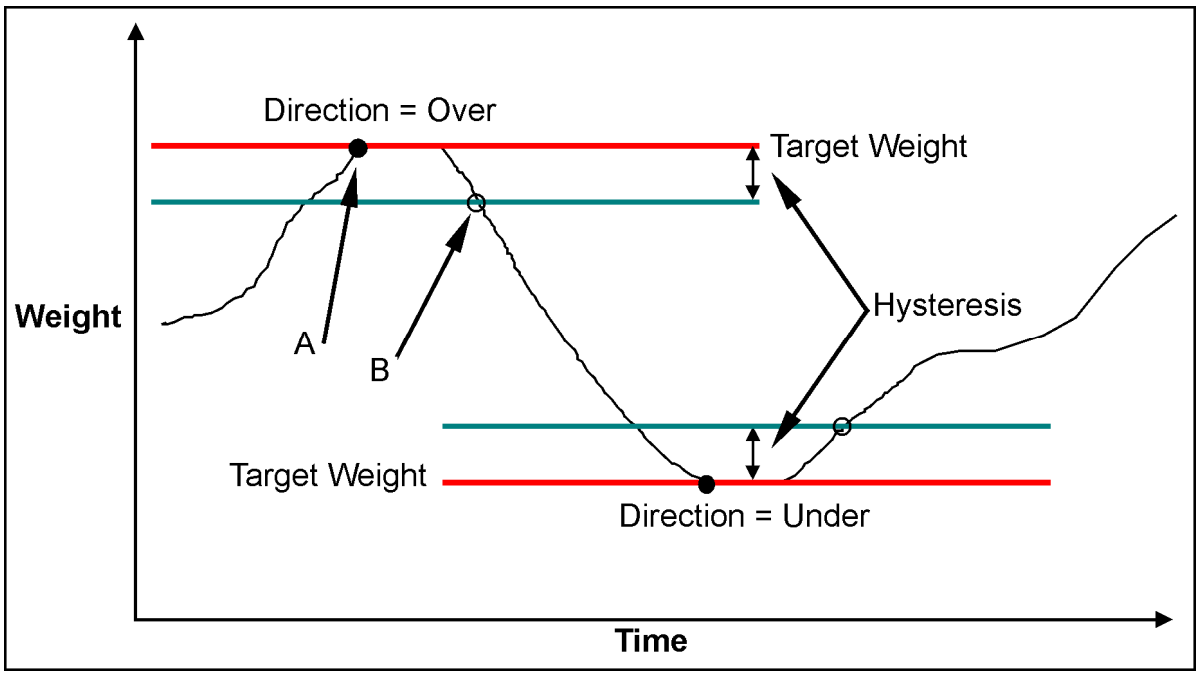


Figure 12: Setpoints Operation (Over vs Under)

Note the difference between Over and Under directions.

- If the Logic is set to **High**, the output is turned on at point **A** and off again at point **B**.
- If the Logic is set to **Low**, the output is turned off at point **A** and on again at point **B**.

8.1.5. Example 1: Control Level of Product in 2000kg Tank

Settings

Direction	Logic	Source	Target	Hysteresis	Weight Initially
Over	Low	Gross	2000kg	200kg	0kg Gross

Operation

The output will initially switch ON at 0kg. The weight in the tank will increase to the target point of 2000kg at which point the output will switch OFF. As product is removed from the tank the weight will drop until it falls below 1800kg (ie. target point - hysteresis). The output will then switch ON again.

Note: If the tank was gravity fed, the logic could be changed to High and the output would then be initially OFF at 0kg. It would switch ON at a weight over 2000kg and switch OFF again as the weight fell below 1800kg.

8.1.6. Example 2: Control Weighing of Product Out of Silo into 100kg Drums

Settings

Direction	Logic	Source	Target	Hysteresis	Weight Initially
Under	Low	Net	–100kg	1kg	0kg Net

Operation

Pressing the TARE key will switch the output ON. This is because 0kg net is higher than the –100kg net target point. The product will leave the silo until the –100kg target point is reached at which point the output will switch OFF. The output will not switch ON again until the net weight is higher than –99kg (ie. target point + hysteresis).

8.2. Remote Input

The **1203** has one remote input that can be configured to perform a variety of operations. Refer to RBT: Remote Button Settings page 45 for more information.

9. Options

9.1. Display/Keys

The capabilities of the **1203** can be expanded by the installation of an optional **1203** display card. The 1203 Display Manual provides full details on **1203/S Service Tool** (Display/ Keys) option.

9.1.1. Installation

The following warnings should be noted prior to installing the **1203** display card.

- Isolate the **1203** from the power before attempting installation.
- Avoid excess handling of the card as each card contains static sensitive devices.
- Hold the card by the edges wherever possible.
- The card must be connected to J3 and latched in place using the supplied stand-offs.

9.1.2. Setup and Calibration

The display card can be used to access all setup and calibration functions.

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10. Commands

10.1. Overview

10.1.1. Commands and Queries

- A **Command** consists of three ASCII characters (eg. **IDN**).
- A **Query** consists of four ASCII characters (the last character being a question mark) (eg. **IDN?**).

Before a command or query can be sent, the unit, which should execute that command, must be selected. Refer to Sxx: Select Unit page 50 for more information.

10.1.2. Responses

The **1203** will return one of the following responses:

Response	Description
0	Indicates that a command has been accepted.
1	When calibrating.
?	Indicates that the command was either not understood or could not be performed.

Specific queries cause the **1203** to respond with the data requested by the query. For example, if the **1203** was setup with **address 4** it would respond with **04** to the **ADR?** query.

10.1.3. Parameters

The following rules apply to parameters:

- A command or query can be followed by one or more parameters.
- Parameters are either numeric (eg. 3000) or strings (eg. "Fred").
- String parameters are delimited by quote characters (**"** ASCII 34). They are taken literally (ie. **"AbCd"** is not the same as **"abcd"**).
- Numeric parameters are variable and leading and trailing spaces are ignored (ie. **003, 03** and **3** are identical).
- Parameters are separated by the comma character (**,** ASCII 44).
- Most parameters may be left out completely. This makes it possible to change one parameter without altering the others. For example **IAD,, "kg"** would change only the units of measurement.

10.1.4. Termination

Termination characters are sent to define the end of a command, query or response. The following are permissible termination characters:

Termination Character	ASCII Code(s)
;	59
LF	10
CRLF	13 10
LFCR	10 13

For example, **ADR?;** is the same as **ADR? CRLF**.

Note: The **1203** invariably uses **CRLF** as the termination of its responses.

10.2. Command Details

10.2.1. ACL: Set Automatic Temperature Calibration On/Off

This is used to set the Automatic Temperature Calibration On/Off.

General Details

No. of Parameters	Save Changes	Changes Used
1	With TDD1	Immediately

Parameter Details

Parameter	Description	Range	Default	Required
1	On/Off	0 to 1 (0: Off, 1: On)	1	No

The **1203** performs an automatic temperature calibration to ensure that changes in ambient temperature do not affect accuracy. This calibration takes about 0.06 seconds. During this calibration no new data is received. If this sample loss creates an obstacle, the automatic temperature calibration can be switched off. Temperature calibrations can then be initiated manually using the **FCN** command (eg. when there is a lull of activity on the scale).

The maximum time between calibrations depends on the ambient temperature gradients and the required accuracy. For most applications, temperature calibration every 5 to 10 minutes is sufficient. **Note:** More frequent calibrations are required during the first 20 minutes after power-up.

10.2.2. ADR: Set Address

This is used to set the address of a unit.

General Details

No. of Parameters	Save Changes	Changes Used
2	With TDD1	Immediately

Parameter Details

Parameter	Description	Range	Default	Required
1	Address	0 to 31	31	No
2	Serial Number	7 Chars	Factory Set	No - Command Only

Each **1203** must be assigned a unique address to enable the implementation of a multi-drop network. The **ADR** command is used to assign the unit address via the communications network.

The following procedure can be used if a **1203** (with a known serial number) and an unknown (or not unique) address is attached to a multi-drop network:

- Select all units using the **S99** command.
- Send the **ADR** command with the new address and the serial number of the chosen unit. The **ADR** command will execute only for the unit with the correct serial number. **Note:** The serial number parameter is used exclusively for this task.
- Continue until all units have unique addresses.

If the serial number is not known, the units must be turned on one at a time. The combination of the **S99** and **ADR** commands can be used to set the addresses.

Example 1: Change Address of Unit from 1 to 2

Command	Response	Details
S01;		Select Unit 1
ADR2;	0 CRLF	Set Address to 2
TDD1;	0 CRLF	Save Change
S02;		Select New Unit 2
IDN?;	Rinstrum,"Site X",^^123456,1203,V1.0 CRLF	Ask for ID

Example 2: Two Units (Unknown Addresses) Configured Using Serial Numbers

Command	Response	Details
S99;		Select All Units
ADR01, "123456";	0 CRLF	Unit With Serial No. "123456" Gets Address 01
ADR02, "123457";	0 CRLF	Unit With Serial No. "123457" Gets Address 02
TDD1;	0 CRLF	Save Address Against Power Loss
S01;		Select New Unit 1
IDN?;	Rinstrum,"Site X",^^123456,1203,V1.0 CRLF	Ask for ID

10.2.3. ANL: Set Analog Output

This is used to set the analog output characteristics.

General Details

No. of Parameters	Save Changes	Changes Used
4	With TDD1	On TDD1 - except "Source" which is used immediately

Parameter Details

Parameter	Description	Range	Default	Required
1	Type	0 to 1 (0: Current Output 1: Voltage Output)	0	No
2	Source	0 to 23 Refer to COF Data Types page 33 for more information.	6	No
3	Source Value at 4mA or 0V	Signed number (decimal) with no decimal points. **Note:** User values should be input in graduations.	0	No
4	Source Value at 20mA or 10V	Signed number (decimal) with no decimal points. **Note:** User values should be input in graduations.	30000	No

Other Standards

The analog outputs can use standards other than 4 to 20mA or –10 to10V. Parameters 3 and 4 must be calculated such that the desired performance is obtained.

For Example:	**Therefore:**
Output Required: 1 to 5V Source: User Gross Source Capacity: 10000	Source Value at 0V = –2500 Source Value at 10V = 22500

Example

Command	Response	Details
S01;		Select Unit 1
ANL0,7,0,30000;	0 CRLF	Set analog output to type: current, source: mV/V gross, Where: 4mA = 0mV/V 20mA = 3mV/V
TDD1;	0 CRLF	Save New Settings

10.2.4. ANM: Set Analog Output Maximum and Minimum

This is used to set the analog output clipping limits.

General Details

No. of Parameters	Save Changes	Changes Used
2	With TDD1	On TDD1

Parameter Details

Parameter	Description	Range	Default	Required
1	Minimum Limit: Percentage of span from 0V or 4mA	–127 to 127	–127	No
2	Maximum Limit: Percentage of span from 0V or 4mA	–127 to 127	127	No

The **ANM** command defines limits for the analog output. It is expressed as a percentage of the nominal output span (10V or 16mA) from nominal output zero (0V or 4mA).

Note: This feature clips the outputs (ie. it will not alter the calibration defined using the **ANL** command).

Standard	Minimum Limit	Maximum Limit
Default	–127 (limited by hardware)	127 (limited by hardware)
–10 to 10V	–100	100
0 to 10V	0	100
1 to 10V	10	100
2 to 10V	20	100
0 to 5V	0	50
1 to 5V	10	50
4 to 20mA	0	100
0 to 20mA	–127 (limited by hardware)	100
0 to 24mA	–127 (limited by hardware)	127 (limited by hardware)

Table 5: ANM: Table of Limit Percentages for Common Standards

For non-standard values, the following formulae can be used to calculate the limits:

$$\text{Current_Percentage} = 100 \ \frac{(\text{Current_Limit}) - 4}{16}$$

Voltage_Percentage = 10 * Voltage Limit

Example

Command	Response	Details
S01;		Select Unit 1
ANL0,7,0,30000;	0 CRLF	Set analog output to type: current, source: mV/V gross, Where: 4mA = 0mV/V 20mA = 3mV/V
ANM0,100;	0 CRLF	Limit the output to 4mA minimum and 20mA maximum.
TDD1;	0 CRLF	Save New Settings

10.2.5. ASF: Set Filtering

This is used to set the filtering, motion detection and zero tracking characteristics of a unit.

General Details

No. of Parameters	Save Changes	Changes Used
2	With TDD1	On TDD1

Parameter Details

Parameter	Description	Range				Default	Required
1	Filter	0 1 2 3 4	1 2 4 8 16	5 6 7 8	32 64 128 256	3	No
2	Motion	0 1 2 3 4 5	Off 0.4u in 1s 0.8u in 1s 1.6u in 1s 3.1u in 1s 6.3u in 1s	6 7 8 9 10 11	12.5u in 1s 25u in 1s 50.0u in 1s 100u in 1s 200u in 1s 400u in 1s	7	No
Where: u = User Graduations							

The **filter** is a sliding window, unweighted average. It can be set from 1 (10ms) to 256 (2.5s) samples. The step-response corresponds directly to this setting.

Step-Response = ((Number of Samples) + 3) * 0.01 [Seconds]

The **motion detection** detects reading motion faster than a threshold value. For example, for setting **1**, movement of more than **0.4** user graduations in **1** second will be detected as motion.

Example

Command	Response	Details
S01;		Select Unit 1
ASF?;	03,01,00 CRLF	Query Filtering Setting
ASF4,2;	0 CRLF	Changed to a 16 reading average with 0.8u in 1s motion setting
TDD1;	0 CRLF	Save New Settings

10.2.6. BDR: Set Baud Rate

This is used to set the communication parameters, baud rate, parity, etc.

General Details

No. of Parameters	Save Changes	Changes Used
2	With TDD1	On TDD1

Parameter Details

Parameter	Description	Range		Default	Required
1	Baud Rate	0 1 2 3 4	1200 2400 4800 9600 19200	3	No
2	Option	Option = Term + Data + Par + Stop Where: Term: RS-485 Terminating Resistors (128:On, 0:Off) Data: Data Bits (0: 8 bits, 64: 7 bits) Par: Parity (0: none, 16: Even, 48: Odd) Stop: Stop Bits (0: 1 bit, 8: 2 bits)		128	No

Example

Change baud rate settings of unit 1.

Command	Response	Details
S01;		Select Unit 1
BDR?;	03,128 CRLF	Query Baud Rate Setting
BDR1,240;	0 CRLF **Note:** New Settings are not used until saved.	Settings changed to 2400 baud, Termination On, 7 Data Bits, Odd Parity and 1 Stop Bit.
TDD1;	0 CRLF **Note:** Reply is sent using the old settings.	Save New Settings

10.2.7. COF: Set Output Format

This is used to set the default output format and reading of the **MSV?** query. It also sets the format and repetition rate for the automatic serial outputs.

General Details

No. of Parameters	Save Changes	Changes Used
3	With TDD1	Immediately

Parameter Details

Parameter	Description	Range	Default	Required
1	Default format for MSV response	0 to 7	5	No
2	Default data type for MSV response	0 to 24 Refer to COF Data Types below for more information.	6	No
3	Time between automatic output (x 10ms)	2 to 255 Values 2 to 9 (intervals of 90ms or less) can only be used with COF Data Types 0 to 11 (refer to COF Data Types below).	10	No
4	Format for auto output	0 to 7	6	No

COF Data Types

Option	Reading Type
0	Raw Absolute
1	Raw Gross
2	Raw Net
3	Raw Maximum
4	Raw Minimum
5	Raw Peak
6	mV/V Absolute
7	mV/V Gross
8	mV/V Net
9	mV/V Maximum
10	mV/V Minimum
11	mV/V Peak
12	Grads Absolute

Option	Reading Type
13	Grads Gross
14	Grads Net
15	Grads Maximum
16	Grads Minimum
17	Grads Peak
18	User Absolute
19	User Gross
20	User Net
21	User Maximum
22	User Minimum
23	User Peak
24	Analog

Note 1: Raw Readings are 24bit Raw ADC Values
Note 2: mV/V Readings = mV/V x 10000
Note 3: Grads Reading = User Graduations
Note 4: User Readings = Weight According to User Calibration
Note 5: Analog = 0 to 10000 (Zero to Zero + Span)

Table 6: COF: Data Types

COF Formats

Binary Formats

Format	Data	Order
0	4 Byte (binary) CRLF	MSB before LSB(=status) Refer to Status A Definition page 35.
1	2 Byte (binary) CRLF	MSB, LSB

Note 1: The binary formats are useful for PLC communications in applications where conversion of the ASCII weight string is not possible. The binary outputs can generally be used directly by the PLC.
Note 2: Binary outputs require serial setting with 8 data bits.

ASCII Formats

In these ASCII tables the following applies:

- Value format is the sign (space or minus), followed by 7 digits (0 to 9) including the decimal point (if used). Leading zero blanking applies.
- Values in square brackets [ ] signify the number of characters in the fixed length response (ie. parameter length in bytes).

	Parameters					
Format	1	2	3	4	5	End
2	Value without decimal point [8]					CRLF
3	Value without decimal point [8]	',' [1]	Address [2]	',' [1]	Status A [3] See Note 2	CRLF
4	Value with decimal point [8]					CRLF
5	Value with decimal point [8]	',' [1]	Address [2]	',' [1]	Status A [3] See Note 2	CRLF

Note 1: Only mV/V readings and user readings have a decimal point. For other data types, format 4 = format 1 and format 5 = format 3.
Note 2: Status A = Refer to Status A Definition page 35.
Note 3: Address will be two digits in the range of 00 to 31.

		Parameters						
Format	Start	1	2	3	4	5	6	End
6 (Rinstrum A)	STX	Value with decimal point [8]	Status B [1] See Note 1					ETX
7 (Rinstrum C)	STX	Value with decimal point [8]	Status C1 [1] See Note 2	Status C2 [1] See Note 3	Status C3 [1] See Note 4	'-' [1]	Units [3]	ETX

Note 1: Status B choices are **G**ross, **N**et, **A**bs, **P**eak, **U**nderload, **O**verload, **M**otion, **E**rror.
Note 2: Status C1 choices are **G**ross, **N**et, **A**bs, **P**eak, **U**nderload, **O**verload, **E**rror.
Note 3: Status C2 choice is **M**otion or space.
Note 4: Status C3 choice is Centre of **Z**ero or space.
Note 5: Units is a three character string, the first character(s) being a space, followed by the actual units (eg. "^kg" or "^^t").

Status A Definition

Decimal Value	Bit No.	Description	Comment
001	0	Overload / Underload	Weight reading out of range overload or underload
002	1	No Motion	
004 008	2 3	00H: Net 04H: Gross 08H: Abs 0CH: Peak	
016	4	Setpoint 1 Active	
032	5	Setpoint 2 Active	
064	6	User Reading	
128	7	Used Internally	
256	8	Centre of Zero	
Binary Note: Bit 8 is not applicable to Binary Format 0.			

Note: The status bits are added together. For example, a status of 6 (4+2) means the weight reading is gross, not within centre of zero, there is no motion and all limit values are inactive.

Example 1: General Use

Command	Response	Details
S01;		Select Unit 1
COF?;	04,19,10,06 CRLF	Query Format
MSV?;	-^^^12.3 CRLF	Query Weight Reading
COF5;	0 CRLF	Change to Format 5
TDD1;	0 CRLF	Save New Setting
MSV?;	-^^^12.3,01,006 CRLF	Query weight reading using the new format

Example 2: Use of Binary Format for PLC Use

Command	Response	Details
Initialisation		
S01;		Select Unit 1
COF0;	0 CRLF	Set Format 0
TDD1;	0 CRLF	Save Format Setting
PLC Operation		
MSV?;		Query weight reading using the new format. In this example the weight is a stable gross reading of 1000kg. COF 8 replies with: <24 bits of weight><8 bit status> CRLF The hexadecimal values of the returned data are <00><03><E8><06><0C><0A> but this data is not printable directly.

10.2.8. ESR: Query Error Status

This is used to query the error status of the instrument.

General Details

No. of Parameters	Save Changes	Changes Used
1	-	-

Parameter Details

Parameter	Description	Range		Default	Required
1	Select Type of Status Information	0 1	Normal Latched	0	No

The **1203** contains both current and latched error status flags. The latched errors are only cleared by resetting the unit (ie. using the **RES** command or powering off). The response string is four hexadecimal characters representing the 16 error bits.

Error Codes

Error	Description	Action
0001	Power Supply Voltage Low	Check Supply
0002	Power Supply Voltage High	Check Supply
0010	Temperature Out of Range	Check Location
0020	User Calibration Resolution Error	Fix Up User Calibration or Scale Build
0040	Positive Sense Error	Check Connection
0080	Negative Sense Error	Check Connection
0100	Setup Information Lost	Re-Enter Setup
0200	Calibration Information Lost	Re-Calibrate
0400	Factory Information Lost (FATAL)	Service
0800	EEPROM Error (FATAL)	Service
1000	A/D Converter Error	Restart/Service
2000	A/D Converter Range Error	Check Connection and Load Cell Output
4000	Communication Bit Error	Check Configuration/ Cabling
8000	ROM Error (FATAL)	Service

Table 7: ESR: Error Codes

The status bits are additive. For example, if the load cell cable is disconnected and therefore neither sense line is connected, the resulting status setting will be 00C0 (0040 + 0080). The numbers add in hexadecimal as follows:

1 - 2 - 3 - 4 - 5 - 6 - 7 - 8 - 9 - A - B - C - D - E - F

(For example, 2 + 4 = 6 or 4 + 8 = C)

Example

Command	Response	Details
S01;		Select Unit 1
ESR?;	0000 CRLF	No Current Errors
ESR?1;	0030 CRLF	Positive and Negative Sense lines were not connected at some time in the past.

10.2.9. FCN: Execute A Function

This simulates pressing an external button using the remote input.

General Details

No. of Parameters	Save Changes	Changes Used
2	Automatically (Zero and Tare Only)	Immediately

Parameter Details

Parameter	Description	Range		Default	Required
1	Function	1 to 15 Refer to RBT Key Functions page 46 for more information.			Yes
1	Wait for No Motion (Zero and Tare Only)	0 1	No Wait Wait	0	No

Note 1: Function execution is performed immediately.

Note 2: Zero and Tare only:

- If immediate execution is not possible because of motion and the wait-for-motion setting is **1**, the termination **2** is returned.
- If immediate execution is not possible because of motion and the wait-for-motion setting is **0**, the termination **?** is returned.

10.2.10. HYS: Set Hysteresis

This is used to set the setpoint hysteresis.

General Details

No. of Parameters	Save Changes	Changes Used
1	With TDD1	Immediately

Parameter Details

Parameter	Description	Range	Default	Required
1	Hysteresis	Signed number (decimal) with no decimal points	1	No

The same hysteresis figure is used for both setpoint outputs. The units of this field are the same as the setpoint source (set in the **LIV** command).

Example

Command	Response	Details
S01;		Select Unit 1
HYS5;	0 CRLF	Set Hysteresis to 5
TDD1;	0 CRLF	Save Setting

10.2.11. IAD: Set Scale Build

This is used to set the scale build parameters.

General Details

No. of Parameters	Save Changes	Changes Used
4	With TDD1	Immediately

Parameter Details

Parameter	Description	Range	Default	Required
1	Number of right side digits. (decimal point position)	0 to 5	3	No
2	Resolution	1 to 100	1	No
3	Units String	2 Characters	""	No
4	Capacity	Unsigned number (decimal) with no decimal points	3000	No

Example

Command	Response	Details
S01;		Select Unit 1
IAD?;	00,05,"kg",^^^^3000 CRLF	Query current scale build parameters
IAD1;	0 CRLF	1 Digit after Decimal Point
TDD1;	0 CRLF	Save Setting

10.2.12. IDN: Set Identification

This is used to set the unit identification string.

General Details

No. of Parameters	Save Changes	Changes Used
2	With TDD1	Immediately

Command Parameter Details

Parameter	Description	Range	Default	Required
1	Identification String	15 Characters	""	No

Query Parameter Details

Parameter	Description	Range	Default	Required
1	Manufacturer		Rinstrum	-
2	Identification String	15 Characters	""	-
3	Serial Number String	0000000 to 999999	(Serial Number)	-
4	Model Number		1203	-
5	Version String		(Version)	-

Note: Only the identification string may be changed. Other parameters are fixed at the factory and are available for information only by using the **IDN?** query.

Example

Command	Response	Details
S01;		Select Unit 1
IDN?;	Rinstrum,"Silo A",^1234567,1203,V1.0 CRLF	Query Current Identification
IDN"Silo X";	0 CRLF	Change Identification String to "Silo X”
TDD1;	0 CRLF	Save Setting

10.2.13. LDW: Calibrate Zero Dead Weight

This command is used to calibrate the zero dead weight. It is possible to calibrate the zero dead weight by either having no load on the scale base or by entering the calculated signal directly.

General Details

No. of Parameters	Save Changes	Changes Used
1	Automatically	Immediately

Parameter Details

Parameter	Description	Range	Default	Required
1	Signal Value of zero (in mV/V x 10000)	Signed number (decimal) with no decimal points		No

The parameter is used to specify a calculated zero. If no parameter is specified, the **LDW** command will use the current scale output for zero calibration.

The **LDW** query returns the zero value in mV/V.

- **Calibration with Weight**

Due to increased averaging, this calibration process takes approximately four seconds to complete. As a result it is necessary to monitor the calibration process to determine when it is finished. While calibrating, all commands and queries are answered with **1**.

Example

Command	Response	Details
S01;		Select Unit 1
LDW;	0 CRLF	Start Zero Calibration
LDW?;	1 CRLF	Query Status of Zero Calibration Process
LDW?;	1 CRLF	Still Busy
LDW?;	^^^12456 CRLF	Zero Calibration Finished (Raw Zero Value)
TDD1;	0 CRLF	Save Setting

- **Direct Calibration**

By using the parameter, a zero value can be set.

Example

Command	Response	Details
S01;		Select Unit 1
COF2,6;	0 CRLF	Select Correct Format and Data Type
MSV?;	5076 CRLF	Current Absolute Reading is 0.5076mV/V
LDW5076;	0 CRLF	Set Zero Dead Load to 0.5076mV/V
LDW?;	^^^^5076 CRLF	Zero Dead Load is 0.5076mV/V
TDD1;	0 CRLF	Save Setting

10.2.14. LIV: Set Limit Value

This is used to set parameters for the two setpoints.

General Details

No. of Parameters	Save Changes	Changes Used
4	With TDD1	Immediately

Parameter Details

Parameter	Description	Range	Default	Required
1	Setpoint Number	0 to 1		Yes
2	Source Data Type	0 to 24 Refer to COF Data Types page 33 for more information.	6	No
3	Target	Signed number (decimal) with no decimal points	0	No
4	Direction/ Logic	0 to 3 = Direction + Logic Direction Under = 0 Direction Over = 1 Logic Low = 0 Logic High = 2	0	No

Example

Command	Response	Details
S01;		Select Unit 1
LIV?1;	01,07,^^^^1245,03 CRLF	Query Setpoint 1 Parameters
LIV1,8,1000,1;	0 CRLF	Change to: Type = mV/V net Target = 1000 Direction = Over Logic = High
TDD1;	0 CRLF	Save Setting

10.2.15. LWT: Calibrate Span

This is used to calibrate the span. It is possible to calibrate the span by either having no load on the scale base or by entering the calculated signal directly.

General Details

No. of Parameters	Save Changes	Changes Used
2	With TDD1	Immediately

Parameter Details

Parameter	Description	Range	Default	Required
1	User reading (if not specified, capacity is used)	Signed number (decimal) with no decimal points	Capacity	No
2	Signal Value of span (in mV/V x 10000) ie. Signal at span - signal at zero	Signed number (decimal) with no decimal points		No

Parameters 1 and 2 are used to specify a calculated span. If parameter 2 is not specified, the **LWT** command will use the current scale output for span calibration.

The **LWT?** query returns the span calibration.

- **Calibration with Weight**

Due to increased averaging, this calibration process takes approximately four seconds to complete. As a result it is necessary to monitor the calibration process to determine when it is finished. While calibrating, all commands and queries are answered with **1**.

Example

Command	Response	Details
S01;		Select Unit 1
LWT2400;	0 CRLF	Start span calibration with load of 2400 (user units).
LWT?;	1 CRLF	Query status of Span Calibration Process
LWT?;	1 CRLF	Still Busy
LWT?;	^^^^2400,^^^12456 CRLF	Span Calibration Finished
TDD1;	0 CRLF	Save Setting

- **Direct Calibration**

By using parameters 1 and 2 a calculated span can be set.

Example

Command	Response	Details
S01;		Select Unit 1
LWT2400,12500;	0 CRLF	Set Span to 1.25mV/V at 2400 User
LWT?;	^^^^2400,^^^12500 CRLF	Span is 1.25mV/V at 2400 User
TDD1;	0 CRLF	Save Setting

10.2.16. MSV?: Query Measured Weight Value

This is used to query weight readings.

General Details

No. of Parameters	Save Changes	Changes Used
4	-	-

Parameter Details

Parameter	Description	Range	Default	Required
1	No. of Consecutive Readings	0 to 60000 (0 means continuous output)	1	No
2	Port Number	0 to 1 (0: RS-232, 1:RS-485)	Network Port	No
3	Data Type	Refer to COF Data Types page 33	COF setting	No
4	Format	Refer to COF Formats page 34	COF setting	No

Example

Command	Response	Details
S01;		Select Unit 1
COF2,7;	0 CRLF	Set Gross mV/V in Output Format 2
MSV?;	^^^^2000 CRLF	Query Displayed Weight
MSV?5;	^^^^2000 CRLF ^^^^2005 CRLF ^^^^2009 CRLF ^^^^2011 CRLF ^^^^2011 CRLF	Query the next five consecutive gross weight readings
MSV?0;	^^^^2011 CRLF ^^^^2011 CRLF ^^^^2012 CRLF …	Enable Continuous Output
STP;		Stop Continuous Output

To stop continuous output send the **STP** command. The format, type and frequency of data returned from the **MSV?** query is controlled by the **COF** setting. Refer to COF Data Types page 33 for more information.

10.2.17. RBT: Remote Button Settings

This is used to setup the function of the remote input. Use the **FCN** command to force the execution of one of these functions using the communications.

General Details

No. of Parameters	Save Changes	Changes Used
2	With TDD1	Immediately

Parameter Details

Parameter	Description	Range	Default	Required
1	Key Operation	0 to 3 Refer to RBT Key Operation below for more information.		Yes
2	Functions	0 to 15 Refer to RBT Key Functions below for more information.	0	No

RBT Key Operation

Option	Operation	Description
0	Short Press	This function is executed when the key is released after being held down for time "**t**" where (50ms<=t<2s).
1	Long Press	This function is executed after the key has been held down for 2 seconds.
2	Button Down	This function is executed after the key has been held down for 50ms seconds.
3	Button Up	This function is executed when the key is released after being held down for at least 50ms seconds.

RBT Key Functions

Option	Key Function	Description
0	None	No Operation
1	Comms Reset RS-232	Reset the comms to 9600n81 with RS-485 disabled and RS-232 in network mode. **Note:** Identical to a short press of the comms reset button.
2	Comms Reset RS-485	Reset the comms to 9600n81 with RS-232 disabled and RS-485 in network mode. **Note:** Identical to a long press of the comms reset button.
3	Zero the Scale	Set Gross Weight to Zero
4	Tare the Scale	Set Net Weight to Zero
5	Reset Peak Values	Reset Stored Peak Values
6	Setpoint A ON	Force Setpoint 1 ON
7	Setpoint A OFF	Force Setpoint 1 OFF
8	Setpoint A Toggle	Force Setpoint 1 to Opposite State
9	Setpoint A Release	Release Setpoint 1 to Normal Operation
10	Setpoint B ON	Force Setpoint 2 ON
11	Setpoint B OFF	Force Setpoint 2 OFF
12	Setpoint B Toggle	Force Setpoint 2 to Opposite State
13	Setpoint B Release	Release Setpoint 2 to Normal Operation
14	Trans1Key	Same as **MSV?** query
15	Temperature Calibration	Perform a temperature calibration. This is most useful when automatic temperature calibrations are disabled using the **ACL** command.

Example 1: Force Setpoint A ON While Button Held (eg. manual fill adjustment)

Command	Response	Details
S01;		Select Unit 1
RBT2,6;	0 CRLF	Set to force setpoint A ON when button is down.
RBT3,9;	0 CRLF	Set to release setpoint A when button is up.
TDD1;	0 CRLF	Save Setting

Example 2: Tare / Zero Button

Command	Response	Details
S01;		Select Unit 1
RBT0,4;	0 CRLF	Tare on Short Press
RBT1,3;	0 CRLF	Zero on Long Press
TDD1;	0 CRLF	Save Setting

10.2.18. RES: Reset

This is used to simulate a power-on reset.

General Details

No. of Parameters	Save Changes	Changes Used
0	-	-

Example

Command	Response	Details
S01;		Select Unit 1
RES;		Reset Unit

10.2.19. SER: Set Serial Communications Settings

This is used to set the serial mode settings for each serial port.

General Details

No. of Parameters	Save Changes	Changes Used
3	TDD1	Immediately

Parameter Details

Parameter	Description	Range		Default	Required
1	Port Number	0 to 1 (0: RS-232, 1:RS-485)			
2	Mode	0 1 2	Disabled Network Mode Automatic Transmit	1	No
3	Data Source (mode 2 only)	0 to 24 Refer to COF Data Types page 33 for more information.		6	No

Automatic transmit will use the data source specified in parameter 3 and the format and frequency specified by the **COF** command.

Example

Command	Response	Details
S01;		Select Unit 1
COF3,,10;	0 CRLF	Set Format to Type 3 and Frequency to 10Hz
SER0,2,7;	0 CRLF	Set RS-232 in Automatic Output Mode Sending Gross mV/V readings.
TDD1;	0 CRLF	Save Setting

10.2.20. STP: Stop Continuous Transfer

This is used to stop continuous weight transmission started by **MSV?0**.

General Details

No. of Parameters	Save Changes	Changes Used
0	-	-

Example

Command	Response	Details
S01;		Select Unit 1
MSV?0;	^^^^2345 CRLF ^^^^2346 CRLF ^^^^2347 CRLF …	Start Continuous Data Transmission
STP;		Stop Continuous Data Transmission

10.2.21. Sxx: Select Unit

This is used to select one or more units with which to communicate.

General Details

No. of Parameters	Save Changes	Changes Used
Special Case	-	-

xx Range Options

xx Range	Operation	Use
00 to 31	Select a single unit with the matching address 00 to 31. All other units are de-selected.	Communication with single unit.
32 to 63	All units execute commands. Only the unit with matching address (subtract 32) responds.	Network blanket command with reply.
64 to 95	Select unit with matching address (subtract 64) but it will not respond. No units are de-selected.	Generate groups of units to execute commands.
96	De-select all units.	
97 to 98	All units will execute commands but none will respond.	Network blanket command without reply.
99	All units are selected and will respond. Reply contention problems if more than one unit is on the network.	Only a single unit (possibly of unknown address) is present on the network.

Example

Command	Response	Details
S01;		Select Unit 1
MSV?;	^^^400.0 CRLF	Query Current Weight
S02;		Select Unit 2
MSV?;	^^^623.5 CRLF	Query Current Weight
S96;		De-Select All Units

10.2.22. TAR: Tare

This is used to perform a preset tare or a measured tare.

Note: Use the **FCN** command to wait for no motion before performing a measured tare.

General Details

No. of Parameters	Save Changes	Changes Used
2	Automatically	Immediately

Parameter Details

Parameter	Description	Range	Default	Required
1	Data Type for Tare Reading	0 to 3 Refer to Data Type for Tare Reading below.	0	No
2	Tare Reading	Signed number (decimal) with no decimal points		No

When no preset tare is specified, (with one exception) this command is exactly the same as pressing a remote input TARE key or taring using the **FCN** command. The exception is that **TAR** does not wait for motion to cease (no motion) before taring.

Data Type for Tare Reading

Option	Type
0	Raw
1	mV/V
2	Grads
3	User

Example

Command	Response	Details
S01;		Select Unit 1
MSV?,,20;	^^^400.0 CRLF	Query Net Weight
TAR;	0 CRLF	Tare
MSV?,,20;	^^^^^0.0 CRLF	Query Net Weight
MSV?,,19;	^^^400.0 CRLF	Query Gross Weight

10.2.23. TDD: Load/Save Setup

This is used to save or restore instrument settings.

General Details

No. of Parameters	Save Changes	Changes Used
1	-	-

Parameter Details

Parameter	Description	Range		Required
1	Command	0 1 2 3 4 5	Reset EE to Default Values Save Current EE Settings Reload EE Settings Reset NV Store to Default Values Write NV Store Read NV Store	Yes

This command allows permanent storage to be manipulated. The NV store holds information which is regularly changed, such as:

- Zero value
- Tare value

The NV storage is automatically saved when these values are changed. The EE storage holds all other settings. The EE storage values are only stored permanently when a TDD1 is received.

Example

Command	Response	Details
S01;		Select Unit 1
COF1;	0 CRLF	Change MSV Format
TDD1;	0 CRLF	Save Settings

11. Appendix

11.1. Glossary of Terms

Term	Definition
Capacity	The maximum gross weight allowed on the scale. This is used to detect overload and underload conditions, etc.
Count-by	The smallest change in weight units that the display can show. See also Resolution.
Division	A single graduation.
EE Storage	Electrically Erasable Storage
EEPROM	Electrically Erasable Programmable Read-Only Memory
EMC	Electromagnetic Compatibility Regulation
Graduations	The maximum number of display steps between zero gross load and full capacity gross load. It is equal to the Capacity divided by the resolution.
LED	Light Emitting Diode
LSB	Least significant bit
MSB	Most significant bit
NV Storage	Non Volatile Storage
PLC	Programmable Logic Controller
Resolution	The smallest change in weight units that the display can show. See also Count-by.
RFI	Radio Frequency Interference
RS-232 and RS-485	Standards for communications hardware layers.
Step-Response	The step-response is the time between placing a weight on the scale and the correct weight reading being displayed.
SYNC Frequency	The sampling frequency of the analog-to-digital converter. It is fixed at 100Hz on the **1203** and defines the FIR filter response.
Transients	A temporary voltage oscillation or spike caused by a sudden change of load (or other external influence).
Units	The actual units of measurement (kilograms, tonnes, pounds, etc.).
Viewer Mode	A temporary mode where the communications ports are always set to 9600 n81. This allows the viewer to be connected (at known baud and bit settings) and all instrument settings to be configured (including the actual communications settings) without changing the actual communications setup. This mode is entered and exited using the Comms Reset switch.

11.2. List of Figures and Tables

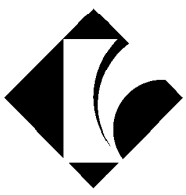
Figure 1: 1203 Weight Transmitter 5
Figure 2: Power Supply..... 7
Figure 3: Load Cell: 6-Wire Connections 8
Figure 4: Load Cell: 4-Wire Connections 9
Figure 5: Sample Installation Method - 1203 with Safety Barriers 10
Figure 6: Comms Reset Switch (SW1) 10
Figure 7: RS-232 Connection (J1) & (J6).....12
Figure 8: RS-485 Connection (J1) & (J6).....13
Figure 9: Input / Output - Setpoints (J10).....14
Figure 10: Input / Output: Inputs (J10).....15
Figure 11: Analog Out Connections.....16
Figure 12: Setpoints Operation (Over vs Under).....23
Table 1: 6-Wire Connections 8
Table 2: Serial 1: RS-232 Port - Connection Outputs 11
Table 3: Serial 2: RS-485 Port - Connection Outputs 11
Table 4: Multi-Drop Networking Connections 12
Table 5: ANM: Table of Limit Percentages for Common Standards 30
Table 6: COF: Data Types 33
Table 7: ESR: Error Codes 36

12. Index

4
4-Wire, 5, 9, 10, 11, 12
6
6-Wire, 6, 8
A
A/D Converter, 6
ACL Command, 27
ADR Command, 28
Analog Calibration Routine, 21
Analog Input, 6
Analog Output, 6, 16, 21
ANL Command, 29
ANM Command, 30
ASCII, 26, 34
ASF Command, 31
Automatic Weight Output, 22
Averaging, 6, 19
B
Backshell, 11
Basic Weighing Terms, 18
Baud, 12, 17, 32
BDR Command, 32
Broad Band Filtering, 19
C
Calibration, 20
Capability, 6
Capacity, 18
COF Command, 33
Command (Individual Details), 27
Command Parameters, 26
Command Responses, 26
Command Termination Characters, 26
Commands and Queries, 26
Comms Reset Switch, 10
Communications, 6, 48
Configured Network Port, 10
Control Button, 17
Copyright, 2
Count-by, 18
Current Requirements, 6
D
Data Bits, 17, 32
Data Source, 21, 48
Data Type, 21
Digital Averaging, 19
Digital Direct mV/V Calibration, 21
Digital Filter, 6
Digital Input, 15
Digital Setup, 18
Digital Span Calibration Routine, 20, 21
Digital Zero Calibration Routine, 20, 21
Direct mV/V Operation, 19
Disclaimer, 2
Division, 18, 53
Document Conventions, 5
E
EEPROM, 20, 21, 53
Electrical Interference, 7
Electro-Magnetic Radiation, 7
EMC, 53
Errors Codes, 36
ESR? Command, 36
Excitation, 6, 8
F
FCN Command, 37
Filtering Techniques, 19
FIR Filter, 19
G
Graduations, 18
Grounding, 10
H
Humidity, 6
HYS Command, 38
I
IAD Command, 39
IDN Command, 40
Impedance, 6
Input / Output, 6
Instability, 7, 8
Installation (Introduction), 7
Interference, 8
Intrinsic Safety, 10
Introduction, 5
Isolated Input, 6
Isolation, 6
L
LDW Command, 41
LED, 5, 23
LIV Command, 42
Load Cell Cable, 7, 8
Load Cell Connection, 8
Load Cell Signals, 7
Load Output, 6
LWT Command, 43
M
MSV? Command, 44
Multi-Drop Network, 12, 22, 28
N
Network Mode, 17, 46
Network Protocol, 6
Networking, 22
Noise Filtering, 19
O
Operating Environment, 6
Output Protection, 6
Overall Error, 6
P
Parity, 17, 32
Password, 18
Permanent Memory, 20
PLC, 5, 22
Power Supply, 6, 7, 14, 15
R
RBT Command, 45
Remote Displays, 5, 22
Remote Input, 24
RES Command, 47
Resolution, 6, 18, 39, 53
RFI, 7, 53
RS-232, 5, 6, 10, 11, 12, 17, 22, 44, 46, 48
RS-485, 5, 6, 10, 11, 12, 13, 17, 22, 32, 44, 46, 48
S
Safety Standards, 6
Sampling Rate, 6
Scale Build, 7
Sense Inputs, 9
Sense Lines, 8, 36
SER Command, 48
Serial Communications Links, 18, 20
Serial Output, 6, 22
Serial Outputs (Introduction), 22
Serial Ports, 10
Setpoint Logic, 23
Setpoints, 14, 23
Sigma-Delta A/D Converter, 5
Signal Strengths, 19
Span Adjustment, 6
Span Value, 21
Stability/Drift, 6
Status Indication, 23
Step-Response, 19, 31
Stop Bits, 17, 32
STP Command, 49
Sxx Command, 50
T
TAR Command, 51
TDD Command, 52
Temperature, 6, 27, 46
Termination Resistors, 12, 22
Test Mass, 20
Transistor Output, 6
U
Units, 18
User Format Information, 20, 21
V
Viewer Mode, 10, 16, 17
Voltage Output, 6, 29
Voltage Outputs, 6
Voltage Range, 6
W
Wire Bridge, 9
Z
Zero Value, 20, 21, 41

Notes:

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