

**6700**  
**Remote**  
**Display**

**Communications**  
**Manual**

**For use with Software**  
**Version 3.0**

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# 1. Introduction

The **6700** is a member of the latest generation of Ranger remote displays. The **6700** may be configured to operate as a simple remote display, a Master of the Ranger 5000 or a summer of several Ranger 5000s. The **6700** operates like a standard Ranger **5000** except that the weight information does not come from the load cell interface but from serially transmitted readings.

The **6700** has two full duplex communications ports and one transmit only port providing the RS232 or RS422/485 protocols. The primary serial port is used to acquire weight readings, whilst the second serial port can be configured as a Ranger Network Slave. This arrangement allows a host such as a PC to acquire data from the **6700**.

The **6700** supports two levels of networking, both of which are covered by this manual. The basic level provides simple commands for mimicking the operation of the front panel keys. The extended networking commands provide complete control multiple units over a multi-drop network.

## 1.1. The Manuals

The Communications Manual (this book) details the configuration for network slave mode and slave commands implemented in the **6700**. The other manuals covering the **6700** are:

- **6700** Reference Manual (6700-600).

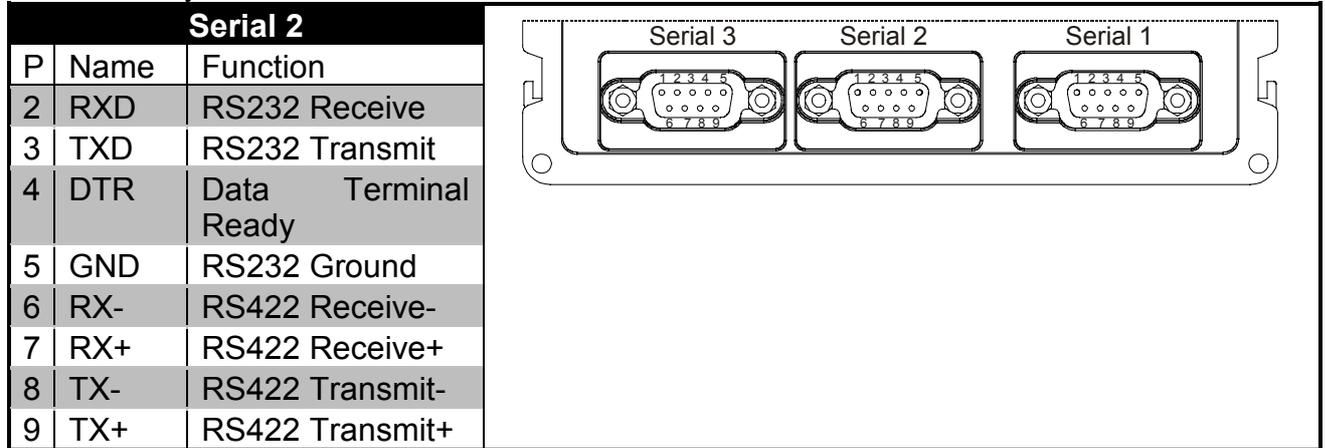
These manuals are available to download from [www.rangerinstruments.com](http://www.rangerinstruments.com).

## 2. Wiring For Network Slave Mode

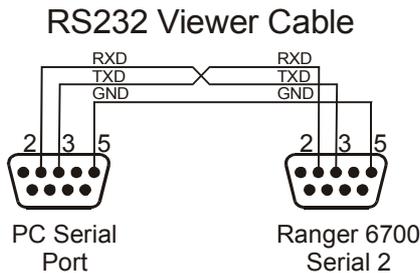
### 2.1. Wiring Diagrams for Network Slave Mode

#### 2.1.1. Pinout for Serial Port 2

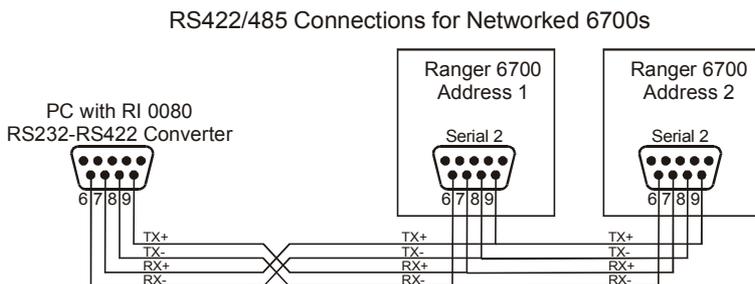
The diagram below shows the location of the serial connections for the 6700. Connect shield directly to the metal DB9 shell.



#### 2.1.2. RS232 Connection



#### 2.1.3. RS485/RS422 Connection



### 2.2. Configuring the 6700 for Network Slave

- Enter the General Setup menus (Press the Setup Key for 2 seconds);
- Set the type (SERIAL:SER2:TYPE) to NET.S;
- Set the data source (SERIAL:SER2:SRC);
- Set the baud rate (SERIAL:SER2:BAUD);
- Set the serial format (SERIAL:SER2:BITS);
- Set the address (SERIAL:SER2:ADDR).

### 3. Basic Network Slave Command Overview

The command structure for basic networking is:

**STX - "K" - (Command) - POLL - ETX**

where

"K" is ASCII upper case letter K (ASCII 75)

POLL is two digits giving this unit's network address. E.g. '01' for address 1

Command is a single character from the list below

The six commands supported at the basic level of networking are as follows:

- "a" Simulate **GROUP** key operation
- "A" Simulate long **GROUP** key operation
- "b" Simulate **ITEM** key operation
- "B" Simulate long **ITEM** key operation
- "c" Simulate **SELECT** key operation
- "C" Simulate long **SELECT** key operation

## 4. Extended Network Slave Command Overview

When operating as a Network Slave, the **6700** accepts a number of commands, in a specified format. This section details the command formats and provides a description of each command.

### 4.1. Commands and Queries

A command consists of three ASCII-characters (eg IDN).

A query consists of four ASCII characters and ends with a question mark (e.g. IDN?).

### 4.2. Responses

The **6700** responds with 0CRLF to indicate that a command has been accepted or ?CRLF to indicate that the command was either not understood or could not be performed.

Specific queries cause the **6700** to respond with the data requested by the query (e.g. The unit would respond with 4 CRLF to a ADR? Query if it was setup with address 4).

### 4.3. Parameters

A command or query can be followed by one or more parameters. Parameters are either numeric (e.g. 3000) or strings (e.g. "Fred").

String parameters are delimited by quote characters ( "" ASCII 34). They are taken literally so that "AbC d" is not the same as "abcd".

Numeric parameters are variable and leading and trailing spaces are ignored. As a result 003 03 and 3 are identical.

Parameters are separated by the comma sign ( ',' ASCII 44).

Parameters may be left out completely so that it is possible to change one parameter without altering the others. For example IAD1,,2; will change the position of the decimal point only.

### 4.4. Termination

Termination characters are sent to define the end of a command, query or response. Permissible termination characters are ';' (ASCII 59), LF (ASCII 10), CRLF (ASCII 13 10), LFCR (ASCII 10 13). For example, the query ADR?; is the same as ADR? CRLF

The **6700** always uses CRLF as the termination of its responses.

## 4.5. Command Summary

### By Name

ADR	Set Address
AFE	Remote Format Enable
AFT	Remote Format Strings
BDR	Serial Parameters
CAF	Currently Active Field
CDL	Set Zero
COF	Set MSV Output Format
CST	Serial Status
DSR	Serial Source
DFT	Restore Default Formats
ENU	Set Units
ESR	Query Error Status
FLD	Data Fields
IAD	Query Scale Build
IDN	Unit Identification
MSV	Query Measured Weight Value
RDT	Run Dot Tests
RES	Reset Unit
Sxx	Select Unit
TAR	Tare Operation
TAS	Gross/Net
TAV	Set Tare Value
TDD	Save/Load Setup
TYP	Serial Type
WMD	Query Weighing Mode

### By Function Group

#### Serial Commands

ADR	Set Address
BDR	Serial Parameters
CST	Serial Status
DSR	Serial Source
IDN	Unit Identification
Sxx	Select Unit
TYP	Serial Type

#### Field Commands

CAF	Currently Active Field
FLD	Data Fields

#### Configuration Commands

AFE	Remote Format Enable
AFT	Remote Format Strings
DFT	Restore Default Formats

#### System Commands

ESR	Query Error Status
RDT	Run Dot Tests
RES	Reset Unit
TDD	Save/Load Setup

#### Master / Summing Commands

CDL	Set Zero
COF	Set MSV Output Format
ENU	Set Units
IAD	Query Scale Build
MSV	Query Measured Weight Value
TAR	Tare Operation
TAS	Gross/Net
TAV	Set Tare Value
WMD	Query Weighing Mode

## 5. Extended Network Command Details

### 5.1. ADR Set Address

Set the address of a unit.

#### General

No. of parameters  
Save changes.

3  
With TDD1

#### Parameter Details

Parameter	Description	Range	Default
1	Port	1..2	1
2	Address	0 .. 31	31
3	Serial Number	"0000001" .. "9999999"	"xxxxxxx" factory set

Each **6700** must be assigned a unique address to enable the implementation of a multi-drop network. It is possible to use the network itself to set the unit addresses. The ADDRESS COMMAND is used to assign the unit address via the communications network.

Before the address of a unit can be changed the unit must be selected to respond to commands. The Select Command (Sxx) (see Section 5.20) is used to select a unit. If the current address of the unit is known use this to select the unit, if not issue the S99; command to select all units. To distinguish between units of the same address use the serial number parameter of the Address Command. The serial number is unique to each unit and only the unit with the matching serial number will respond to the Address Command. If neither the current address nor serial number of the units is known, turn off all the units in the network and then turn on one unit at a time. The combination of S99; and ADR command will then allow each unit to be configured.

#### Example 1:

Change address of unit from 1 to 2

S01;		Select unit 1
ADR2,2;	0 CRLF	Set address to 2
TDD1;	0 CRLF	Save change
S02;		Select new unit 2
IDN?;	"1234567","V1.0","6700" CRLF	Ask for ID

#### Example 2:

Two units with unknown addresses are configured using their serial numbers.

S99;		
ADR2,01,"12345	0 CRLF	Unit with serial no.
67";		"1234567" gets address 01
ADR2,02,"76543	0 CRLF	Unit with serial no.
21";		"7654321" gets address 02
S01;TDD1;	0 CRLF	Save addresses against
S02;TDD1;	0 CRLF	power loss
S01;		Select the new unit 1
IDN?;	"1234567","V1.0","6700"	Ask for ID
	CRLF	

## 5.2. AFE Remote Format Enable

Enable and disable remote formats.

### General

No. of parameters  
Save changes.

2  
With TDD1

### Parameter Details

Parameter	Description	Range
1	Format	0..4
2	Enabled	0..1

### Example 1:

Request Enable status of Formats.

S01;		Select unit 1
AFE?0;	0 CRLF	Format 0 is Disabled
AFE?1;	1 CRLF	Format 1 is Enabled

### Example 2:

Enable Format 0.

S01;		Select unit 1
AFE0,1;	0 CRLF	Enable Format 0
TDD1;	0 CRLF	Save settings

## 5.3. AFT Remote Formats

Alter the format string for each of the Remote Formats.

### General

No. of parameters  
Save changes.

3  
With TDD1

### Parameter Details

Parameter	Description	Range
1	Format Number	1..4
2	Format String Read	"130,167,...."
2	Format String Write Posn	0..20
3	Format String Write Character	0..255

See Reference Manual for details on the auto format string.

### Example 1:

Read Format 1.

S01;		Select unit 1
AFT?1;	"167,180,0" CRLF	Read Format 1

### Example 2:

Write Format 1.

S01;		Select unit 1
AFT1,0,167;	0 CRLF	Posn 0 = 168
AFT1,1,180;	0 CRLF	Posn 1 = 180
AFT1,2,0;	0 CRLF	Posn 2 = 0
TDD1;	0 CRLF	Save settings.

## 5.4. BDR Set Serial Parameters

Set the communication parameters, baud rate, parity etc.

### General

No. of parameters 6  
 Save changes. with TDD1

### Parameter Details

Parameter	Description	Range		Default
1	Port	1	Primary	
		2	Secondary	
2	Baud Rate	0	300	5 (9600)
		1	600	
		2	1200	
		3	2400	
		4	4800	
		5	9600	
		6	19200	
		7	AUTO	
3	Parity	0	None	0 (None)
		1	Odd	
		2	Even	
4	Data Bits	0	7	1 (8 Bits)
		1	8	
5	Stop Bits	0	1	0 (1 Stop)
		1	2	
6	Termination Resistors	0	Off	0 (Off)
		1	On	

### Example:

S01;		Select unit 1
BDR?1;	6,0,1,0,0 CRLF	Query primary serial settings
BDR1,3,1,0,0,1;	0 CRLF (Note that the reply is sent using the new settings)	Primary settings changed to 2400 baud, odd parity, 7 data bits, 1 stop bit, term on.
TDD1;	0 CRLF	Save new settings.

## 5.5. CAF Currently Active Field

Query the currently active field.

### General

No. of parameters 1

### Parameter Details

Parameter	Description	Range	Default
1	Field	0..4	

### Example:

S01;		Select unit 1
CAF?;	2 CRLF	Field 2 is currently active
CAF0;	0 CRLF	Set Field 0 active

**5.6. CDL Set Zero**

Set the zero dead load cancellation. This is analogous with pressing the ZERO key on the front of the instrument. This command is only available in Network and Summing Master modes. The zero command is passed through to the slave units attached to the 6700.

**General**

No. of parameters 0  
 Save changes. At input  
 Increment Trade Counter no

If the Set zero operation is not possible due to the value of the current weight reading or due to instability the 6700 will return '?'.

**Example:**

Set zero dead load of unit 1.

```
S01;                               Select unit 1
CDL;      0 CRLF                   Zero dead load set
                                       successfully.

                                       < load disturbed >
CDL;      ? CRLF                   Setting of zero dead
                                       load not possible due to
                                       motion, error or dead
                                       load range.
```

**5.7. COF Set Output Format**

Set the output format of the MSV? Query.

**General**

No. of parameters 1  
 Save changes. with TDD1  
 Increment Trade Counter no

**Parameter Details**

Parameter	Description	Range	Default
1	Format setting	0..11	6

**Binary Formats**

Format	Data	Order
0	4 Byte (binary) CRLF	MSB before LSB(=00h)
2	2 Byte (binary) CRLF	MSB, LSB
4	4 Byte (binary) CRLF	LSB(=00h) before MSB
6	2 Byte (binary) CRLF	LSB, MSB
8	4 Byte (binary) CRLF	MSB before LSB (=Status)

**ASCII Formats**

Format	Parameter 1	Parameter 2	Parameter 3
1 & 3	Weight (8)		CRLF
5 & 7	Weight (8)	, Address (2)	CRLF
9 & 10	Weight (8)	, Address (2)	, Status (3) CRLF
11	Weight (8)	, Address (2)	, Extended Status (3) CRLF

Values in brackets signify the number of characters in the fixed length response.

The weight format is the sign (space or minus), followed by 7 digits 0..9 including the decimal point if used.

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.

**Status Details**

Status	Description	Bit	Comment
001	Overload	0	Weight reading out of range overload or underload
002	Standstill	1	
004	Gross	2	
008	Range 2 active	3	Only with multi-range or multi-interval
016	Limit Value 1 active	4	
032	Limit Value 2 active	5	
064	Limit Value 3 active	6	
128	Limit Value 4 active	7	
256	Center of Zero	8	This status bit is only available in the extended status - Format 11 only.

Note that the status bits are added together, for example a status of 6 (4+2) means the weight reading is a Gross value with no motion, range 1, and all limit values are inactive.

**Example 1:**

S01;		Select unit 1
COF?;	3 <i>CRLF</i>	Query format
MSV?;	-00001.0 <i>CRLF</i>	Query weight reading.
COF9;	0 <i>CRLF</i>	Change to format 9
TDD1;	0 <i>CRLF</i>	save new setting
MSV?;	-00001.0,01,006 <i>CRLF</i>	Query weight reading using the new format.

**Example 2:** Use of Binary format for PLC use

Initialisation

S01;		Select unit 1
COF8;	0 <i>CRLF</i>	Set format 8
TDD1;	0 <i>CRLF</i>	Save format setting

PLC Operation

MSV?;	<i>CRLF</i>	Query weight reading using the new format. In this example the weight is a stable gross reading of 1000 kg. COF 8 replies with < 24 bits of weight><8 bit status><CRLF> the hexadecimal values of the returned data are <00><01><E8><06><0C><0A> but this data is not printable directly.
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**5.8. CST? Get Serial Status**

Query the serial port for bytes received / errors / etc.

**General**

No. of parameters 1

**Parameter Details**

Parameter	Description	Range		Default
1	Port	1 2	Primary Secondary	

**Reply Parameter Details**

Parameter	Description
1	Received Bytes Count
2	Receive Error Count
3	Receive Bytes in Buffer
4	Transmitted Bytes Count
5	Transmit Bytes in Buffer

**Example:**

S01; Select unit 1  
 CST?1; 107,0,0,106,0 CRLF Query primary serial status

**5.9. DSR Set Serial Source**

Set the serial data source for each port.

**General**

No. of parameters 2  
 Save changes with TDD1

**Parameter Details**

Parameter	Description	Range		Default
1	Port	1 2	Primary Secondary	
2	Source for Primary	0 1 2	Scan RS232 RS422	1 (RS232)
2	Source for Secondary	1 2	RS232 RS422	1 (RS232)

**Example:**

S01; Select unit 1  
 DSR?1; 2 CRLF Query primary source  
 DSR1,3; 0 CRLF Primary source set to current loop.  
 TDD1; 0 CRLF Save new settings.

**5.10. DFT Restore Default Formats**

Restore the default remote formats in the unit.

**General**

No. of parameters 0

### 5.11. ENU Set Units

Set the units of weight to be displayed and printed. In Network Master mode, the **6700** retrieves this value from the remote unit. In all other modes, this field is set from the **6700** menus.

**General**

No. of parameters 1  
 Save changes with TDD1

**Parameter Details**

Parameter	Description	Range	Default
1	Weight units	0 none 1 g 2 kg 3 lb 4 t	2

**Example:**

S01;		Select unit 1
ENU?;	2 <i>CRLF</i>	Query units setting.
ENU1;	0 <i>CRLF</i>	Change units to grams
TDD1;	0 <i>CRLF</i>	Save new setting.

### 5.12. ESR? Query the Error Status

Query the error status of the display.

**General**

No. of parameters 1

**Parameter Details**

Parameter	Description	Range	Default
1	Type of status	0 Current status 1 Latched status 2 Comms Errors	0

The **6700** contains both current and latched error status flags. The latched errors can only be cleared by resetting the unit (RES command or power off). The status string is 4 hexadecimal characters representing the 16 error bits. Communication errors indicate problems with interpreting the incoming data. All error codes are covered in the Reference Manual.

**Example:**

S01;		Select unit 1
ESR?;	0000 <i>CRLF</i>	No current system errors
ESR?2;	0001 <i>CRLF</i>	A data timeout has occurred

### 5.13. FLD Set/Query Data Fields

Set the serial data source for each port.

**General**

No. of parameters 5

**Parameter Details**

Parameter	Description	Range	Default
1	Field Number	0..4	0



**5.15. IDN? Query Identification**

Set the unit identification string.

**General**

No. of parameters 1

**Parameter Details**

Parameter	Description	Range	Default
1	Serial Number string	"0000000" .. "9999999"	factory set, unique to each unit
2	Version string	"V1.0"	
3	Model string	"6700"	

**Example:**

S01; Select unit 1  
IDN?; "1234567","V3.0","6700" CRLF Query current  
identification.

**5.16. MSV? Query Measured Weight Value**

Query weight readings.

**General**

No. of parameters 2  
Save changes. -  
Increment Trade Counter -

**Parameter Details**

Parameter	Description	Range	Default
1	Type of reading	1 displayed weight 2 gross weight 3 net weight	1
2	Number of consecutive readings ( 0 means continuous output)	0..60000	1

**Example:**

S01; Select unit 1  
COF3; 0 CRLF Get output format 3  
MSV?; 00200.0 CRLF Query displayed weight  
MSV?2; 00400.0 CRLF Query gross weight  
MSV?2,5; 00400.0 CRLF Query the next 5  
00400.1 CRLF consecutive gross weight  
00400.2 CRLF readings.  
00400.3 CRLF  
00400.4 CRLF  
CRLF  
MSV?,0 00400.0 CRLF Enable continuous output  
00400.1 CRLF  
00400.2 CRLF  
....  
STP; Stop continuous output

Note that the CRLF is sent after each reading for the ASCII formats but not for the binary formats. With the binary formats a single CRLF is sent at the end of the response regardless of the number of readings requested.

To stop continuous output send a STP; command. During continuous output the 6700 will not respond to other commands.

The format of data returned from the MSV? command is controlled by the COF setting. See the COF command for details on the available formats.

**5.17. OPT Display Options**

Set general options for the unit.

**General**

No. of parameters 1

**Parameter Details**

Parameter	Description	Range	Default
1	Number of slaves	0 1 Slave 1 2 Slaves 2 3 Slaves 3 4 Slaves 4 5 Slaves 5 6 Slaves 6 7 Slaves 7 8 Slaves 8 9 Slaves 9 10 Slaves	

**Example:**

S01; Select unit 1  
OPT?; 1CRLF Query options

**5.18. RDT Run Display Test**

This command activates the dot test of the display.

**General**

No. of parameters 1

**Parameter Details**

Parameter	Description	Range	
1	Display Test Status	0 Off 1 On	

**Example:**

S01; Select unit 1  
RDT?; 1 CRLF Dot test is running.  
RDT0; 0 CRLF Stop dot test

**5.19. RES Reset**

Use this command to perform a power-on reset.

**General**

No. of parameters 0

**Example:**

S01; Select unit 1  
RES; Reset unit.

## 5.20. Sxx Select Unit

The Sxx command is used to select one or more units with which to communicate.

- S00 to S31 selects a single unit with the matching address 00 to 31.
- S96: Special Function: De-select all units.
- S97 & S98: Special Function: All units are selected but none reply to commands. This mode is very useful for blanket commands for an entire network of units.
- S99: Special Function: Selects all units and all respond. S99 is useful when a single unit is connected to the network as it is possible to select this unit regardless of its address setting.

**Example:**

S01;		Select unit 1
FLD?0;	" 1234",0,0,24 CRLF	Query field 0
S02;		Select unit 2
FLD?0;	" 2748",0,0,24 CRLF	Query field 0
S96;		De-select all units

## 5.21. STP Stop Continuous Transfer

Stop continuous weight transmission started by MSV?,0; command.

**General**

No. of parameters	0
Save changes.	-
Increment Trade Counter	-

**Example:**

S01;		Select unit 1
MSV?,0;	00400.0 CRLF	Start continuous data
	00400.1 CRLF	transmission.
	00400.2 CRLF	
	...	
STP		Stop continuous data
		transmission.

## 5.22. TAR Tare

Force a TARE operation. This command is only available in Network and Summing Master modes. The tare command is passed through to the slave units attached to the 6700.

**General**

No. of parameters	0
Save changes.	At input

This command is exactly the same as pressing the TARE key on the front of the instrument except that the 6700 does not wait for no motion. If the current weight reading is not stable the 6700 will return '?' and ignore the TAR command.

**Example:**

S01;		Select unit 1
MSV?;	00400.0 CRLF	Query current weight
TAR;	0 CRLF	TARE
MSV?;	00000.0 CRLF	Query current weight



1	Command	0	Load ROM default values
		1	Save current settings
		2	Reload previous settings

**Example:**

S01;			Select unit 1
TYP1,3;	0	CRLF	Set primary type to Sum Master
TDD1;	0	CRLF	Save settings

**5.26. TYP Serial Type**

Sets the serial type for each serial port.

**General**

No. of parameters	2
Save changes	TDD1

**Parameter Details**

Parameter	Description	Range	Default
1	Port	1 2	Primary Secondary
2	Type Setting	Primary 0 2 3 Secondary 1 6 7	Remote Net Master Sum Master Net Slave Auto Output Printer

**Example:**

S01;			Select unit 1
TYP?1;	0	CRLF	Primary type is Remote
TYP1,3;	0	CRLF	Set primary type to Sum Master
TDD1	0	CRLF	Save changes

**5.27. WMD? Query Weighing Mode**

Query the weighing mode of the instrument. This indicates the range setting for the slave instruments and is implemented based on settings queried from the remote units. The Trade mode setting always defaults to Industrial. Since the WMD settings apply to the remote units and not the **6700** it is not possible to set them.

**General**

No. of parameters	2
-------------------	---

**Parameter Details**

Parameter	Description	Range	Default
1	Weighing mode	1 2	single range dual range
2	Trade mode	Always 1 (Industrial)	

**Example:**

S01;			Select unit 1
WMD?;	1,1	CRLF	Query current weighing mode

## 6. ASCII Codes

The following table shows the ASCII codes for control and printable characters.

Code	Char	Code	Char	Code	Char	Code	Char	Code	Char
000	NULL	026	SUB	052	'4'	078	'N'	104	'h'
001	SOH	027	ESC	053	'5'	079	'O'	105	'i'
002	STX	028	FS	054	'6'	080	'P'	106	'j'
003	ETX	029	GS	055	'7'	081	'Q'	107	'k'
004	EOT	030	RS	056	'8'	082	'R'	108	'l'
005	ENQ	031	US	057	'9'	083	'S'	109	'm'
006	ACK	032	' ' (space)	058	':'	084	'T'	110	'n'
007	BEL	033	'!	059	','	085	'U'	111	'o'
008	BS	034	"""	060	'<'	086	'V'	112	'p'
009	HT	035	'#'	061	'='	087	'W'	113	'q'
010	LF	036	'\$'	062	'>'	088	'X'	114	'r'
011	VT	037	'%'	063	'?'	089	'Y'	115	's'
012	FF	038	'&'	064	'@'	090	'Z'	116	't'
013	CR	039	""	065	'A'	091	'['	117	'u'
014	SO	040	'('	066	'B'	092	'\'	118	'v'
015	SI	041	')'	067	'C'	093	']'	119	'w'
016	DLE	042	'*'	068	'D'	094	'^'	120	'x'
017	DC1	043	'+'	069	'E'	095	'_'	121	'y'
018	DC2	044	','	070	'F'	096	""	122	'z'
019	DC3	045	'.'	071	'G'	097	'a'	123	'{'
020	DC4	046	':'	072	'H'	098	'b'	124	' '
021	NAK	047	'/'	073	'I'	099	'c'	125	'}'
022	SYN	048	'0'	074	'J'	100	'd'	126	'~'
023	ETB	049	'1'	075	'K'	101	'e'	127	DEL
024	CAN	050	'2'	076	'L'	102	'f'		
025	EM	051	'3'	077	'M'	103	'g'		