

# Interface

## 9325 USB Communication Details



9325

Portable Sensor Display

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## Introduction/overview

The 9325 allows simple display of strain bridge-based measurements such as load cells and pressure gages with sensitivity up to +/-480 mV/V.

For details on configuration and use, see the Quick Start Guide and User Manual available at [interfaceforce.com](http://interfaceforce.com). This manual is intended to show how to read basic information from the 9325 via the USB connection using a virtual com port.

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## Getting started

If you do not install the 9325 Toolkit (with the drivers) the 9325 will simply appear as a virtual com port. After toolkit installation, it will appear as a **9325 Serial Device**.

The toolkit is available at [interfaceforce.com](http://interfaceforce.com). All setup/configuration should be carried out using the Toolkit, the instructions in this manual are for reading measured values.

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## Communication overview

Communication is via an ASCII protocol.

The ASCII protocol uses only printable characters and carriage-return ('<CR>'), which allows a "dumb" terminal device or a PC programme like Hyper-Terminal or Tera Term to interrogate the device.

The protocol allows you to

- Read a parameter or result
- Execute a command

If you want to perform other communication functionality such as performing calibration you will need to refer to the 9325 User Manual and the 9325 Toolkit.

Communication settings for the virtual COM port are as follows:

- Baud rate 115200 (autosensing, others can be used)
  - no parity
  - 8 data bits
  - 1 stop bit
- 

## Commands

We have two available command types, **READ** and trigger **COMMAND**.

To **read** a parameter, enter the parameter number, followed by a question mark and carriage return. For instance, to read the **GROSS** value of the currently selected calibration range:

```
A204? <CR>
```

Which will return a message in this format:

```
A204=4499CA8F
```

(This is the 4 byte value (MSB first) held in the **GROSS** register in IEEE 754 floating point format. In this case, the decoded value is 1230.320)

To trigger a **command**, enter the command parameter number followed by an equals sign and carriage return.

For instance, to trigger the command, **NEXT RANGE**:

```
A3B0= <CR>
```

Which will return the message:

```
A3B0=
```

And the next available range will be selected on the display and for the readings.

**!** **Do not put anything after the equals sign or use any commands not listed as you could break the device which may require a return to factory and associated costs to fix.**

See appendix 1 for error codes.

## Parameters in Access Order

Command	Name	Format	Permissions	Description
Time & Date				
2007	DATE AND TIME	DATE	RO	Real-time clock in Epoch Unix format
Calibration Data				
3200	CAL INDEX	UINT16	RW	Calibration index (sets what range/table is selected for parameters 3201-3208) 0-Range 1 or TEDS Table STD 1-Range 2 or TEDS Table 1 2-Range 3 or TEDS Table 2 3-Range 4 or TEDS Table 3 4-Range 5 or TEDS Table 4 5-Range 6 or TEDS Table 5
3201	CAL NAME	STRING	RO	Calibration range name (10 bytes)
3202	CAL UNIT	UINT8	RO	Calibrated units (See appendix 3 for decoding)
3203	CAL TYPE	UINT8	RO	Calibration type 0 = Disabled 1 = Gain and Offset 3 = Multi Point 4 = Polynomial
3206	CAL DATE (Firmware 1.05 or later)	UINT32	RO	Calibration Date (In Binary Coded Decimal: 31 <sup>st</sup> December 1999 expressed as 0x19991231)
3207	CAL INITIALS	STRING	RO	Calibrator's initials (3 bytes)
3208	CAL SENSITIVITY	UINT8	RO	1 = +/-480 mV/V 2 = +/-240 mV/V 3 = +/-120 mV/V 4 = +/-60 mV/V 5 = +/-30 mV/V 6 = +/-15 mV/V 7 = +/-7.5 mV/V
Alarms				
A100	ALARM STATE	UINT8	RO	0 = Alarm inactive 1 = Alarm active
Labels				
A010	RANGE NAME	STRING	RO	Current selected range name string
Measurement Flags				
A120	TARE ACTIVE	UINT8	RO	0 = No tare value applied 1 = Tare value applied
A122	MV/V LOW	UINT8	RO	0 = mV/V input above minimum value 1 = mV/V input below minimum value
A123	MV/V HIGH	UINT8	RO	0 = mV/V input below maximum value 1 = mV/V input above maximum value
A124	GROSS LOW	UINT8	RO	0 = GROSS above minimum value 1 = GROSS below minimum value
A125	GROSS HIGH	UINT8	RO	0 = GROSS below maximum value 1 = GROSS above maximum value

A126	SCALE STEADY	UINT8	RO	0 = Scale not steady 1 = Scale steady
A127	GROSS POLARITY	UINT8	RO	0 = GROSS value is negative 1 = GROSS value is positive
A128	NET POLARITY	UINT8	RO	0 = NET value is negative 1 = NET value is positive
A12A	FOUR WIRE ACTIVE	UINT8	RO	0 = 6 wire measurement active 1 = 4 wire measurement active
A12B	SHUNT CAL ACTIVE	UINT8	RO	0 = Shunt cal inactive 1 = Shunt cal active
A12C	CALIBRATION ERROR	UINT8	RO	0 = No calibration error detected 1 = Calibration error detected
TEDS Flags				
A160	TEDS PRESENT	UINT8	RO	0 = TEDS not present 1 = TEDS present
A161	TEDS OVERRIDE	UINT8	RO	0 = TEDS enabled 1 = TEDS disabled
A162	TEDS ERROR	UINT8	RO	0 = No TEDS error detected 1 = TEDS error detected (See D050 below for detail)
Measurements				
A201	MV/V	FLOAT	RO	The factory calibrated input in mV/V
A202	ENG	FLOAT	RO	The calibrated value in Engineering units
A203	GROSS HOLD	FLOAT	RO	The GROSS value for 'Hold' & 'Run' mode
A204	GROSS	FLOAT	RO	The GROSS value (after system zero)
A205	GROSS MAX	FLOAT	RO	The maximum GROSS load measurement
A206	GROSS MIN	FLOAT	RO	The minimum GROSS load measurement
A207	GROSS DELTA	FLOAT	RO	The difference between GROSS max and min values
A208	NET HOLD	FLOAT	RO	The NET load for 'Hold' & 'Run' mode
A209	NET	FLOAT	RO	The NET value
A20A	NET MAX	FLOAT	RO	The maximum NET measurement
A20B	NET MIN	FLOAT	RO	The minimum NET measurement
A20C	NET DELTA	FLOAT	RO	The difference between NET max and min values
Measurement Commands				
A300	RESET STATS	EMPTY	CMD	Reset the max/min statistics
A302	CAPTURE TARE	EMPTY	CMD	Capture a new TARE value
A303	ZERO TARE	EMPTY	CMD	Zero the TARE value
Next Range Selection				
Note: this cycles through the ranges made available in the toolkit				
A3B0	SELECT NEXT RANGE	EMPTY	CMD	Select the next calibration
A3B1	SELECT PREV RANGE	EMPTY	CMD	Select the previous calibration
Direct Range Selection				
Note: this allows access to all ranges, even if they have been disabled in the toolkit				
A3C0	SELECT RANGE 1	EMPTY	CMD	Select the 1st calibration range
A3C1	SELECT RANGE 2	EMPTY	CMD	Select the 2nd calibration range
A3C2	SELECT RANGE 3	EMPTY	CMD	Select the 3rd calibration range
A3C3	SELECT RANGE 4	EMPTY	CMD	Select the 4th calibration range
A3C4	SELECT RANGE 5	EMPTY	CMD	Select the 5th calibration range
A3C5	SELECT RANGE 6	EMPTY	CMD	Select the 6th calibration range
TEDS Calibration Tables				

A3E0	SELECT TEDS TABLE STD	EMPTY	CMD	Select the standard 2-point TEDS calibration table
A3E1	SELECT TEDS TABLE 1	EMPTY	CMD	Select the 1st TEDS calibration table
A3E2	SELECT TEDS TABLE 2	EMPTY	CMD	Select the 2nd TEDS calibration table
A3E3	SELECT TEDS TABLE 3	EMPTY	CMD	Select the 3rd TEDS calibration table
A3E4	SELECT TEDS TABLE 4	EMPTY	CMD	Select the 4th TEDS calibration table
A3E5	SELECT TEDS TABLE 5	EMPTY	CMD	Select the 5th TEDS calibration table
<b>Alarms</b>				
A400	CANCEL ALARM	EMPTY	CMD	Cancel latched alarm
<b>Unit of Measure</b>				
D011	CALIBRATED UNITS	UINT8	RO	The calibrated unit ID for measurements (See appendix 3 for decoding)
<b>Information</b>				
D020	SELECTED RANGE	UINT8	RO	The currently-selected calibration range 0-Range 1 or TEDS Table STD 1-Range 2 or TEDS Table 1 2-Range 3 or TEDS Table 2 3-Range 4 or TEDS Table 3 4-Range 5 or TEDS Table 4 5-Range 6 or TEDS Table 5
<b>TEDS Diagnostic Information</b>				
D050	TEDS ERROR FLAGS	UINT32	RO	The TEDS errors last detected (See appendix 2 for decoding)
D051	TEDS TABLES	UINT16	RO	The available TEDS calibration tables Bit 0 TEDS Table STD 1 TEDS Table 1 2 TEDS Table 2 3 TEDS Table 3 4 TEDS Table 4 5 TEDS table 5

**Formats**

<b>Type</b>	<b>Description</b>
DATE	Epoch timestamp, 32-bit hexadecimal
UINT8	Unsigned 8-bit integer
UINT16	Unsigned 16-bit integer
UINT32	Unsigned 32-bit integer
FLOAT	IEEE 754 4-byte floating point (MSB)
STRING	ASCII string
EMPTY	No data to read

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## Examples

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### Check Current Date and Time

DATE AND TIME

2007? <CR>

Returns

2007=6336CD7E

Friday, 30 September 2022 11:05:34

---

### Check selected range, calibrated unit and read gross value

D020? <CR>

SELECTED RANGE Returns

D020=01

Range 2 currently selected

CALIBRATED UNITS

D011? <CR>

Returns

D011=2D

kg

GROSS

A204? <CR>

Returns

A204=4411CE46

GROSS=583.2230

---

### Check and select Range 4

SELECTED RANGE

D020? <CR>

Returns

D020=01

Range 2 currently selected

SELECT RANGE 4

A3C3= <CR>

Returns

A3C3=

Range 4 selected

SELECTED RANGE

D020? <CR>

Returns

D020=03

Range 4 currently selected

---



---

## Check Current Selected Range Name

### RANGE NAME

A010? <CR>

### Returns

A010=54454453205354440000

TEDS STD

---

## Tare

### NET

A209? <CR>

### Returns

A209=41400000

NET=12.00000

### CAPTURE TARE

A302= <CR>

### Returns

A302=

### NET

A209? <CR>

### Returns

A209=00000000

NET=0.000000

### TARE ACTIVE

A120? <CR>

### Returns

A120=01

Tare value applied

### ZERO TARE

A303= <CR>

### Returns

A303=

### TARE ACTIVE

A120? <CR>

### Returns

A120=00

No tare value applied

---

# Appendices

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## Appendix 1- Communication error codes

Error code	Error Description
1	Invalid parameter
2	Not readable
3	Value too long
4	Value too short
5	Not writable
6	Not authorised
7	Exceeds lower limit
8	Exceeds higher limit
9, 10, 11	General error

---

## Appendix 2- TEDS error codes

Bit	Error Description
0	1-wire EEPROM not supported
1	Read from 1-wire EEPROM failed
4	TEDS decoding failed on a read
5	CRC in TEDS read failed
6	Read from TEDS failed
7	Error reading from standard TEDS template
8	Error reading from calibration TEDS template
9	TEDS contains too many calibration templates (>5)
10	Template 40 contains too many calibration points (>10)
11	Template 41 contains too many polynomial coefficients (>10)
12	Template 41 contains too many segments (>1)
13	Template 42 contains too many entries (>10)

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## Appendix 3- Units

Category	ID	Unit	Symbol
<b>Voltage Ratio</b>			
	0x00	milliVolts/Volt	mV/V
	0x01	Volts/Volt	V/V
	0x02	microVolts/Volt	µV/V
<b>Angle</b>			
	0x03	radians	rad
	0x04	degrees	°
	0x05	circumference	
	0x06	grade	
	0x07	minutes	'
	0x08	seconds	
	0x09	revolutions	rev

<b>Length</b>			
0x0F	meters	m	
0x10	angstrom	Å	
0x11	astronomical unit	AU	
0x12	centimeters	cm	
0x13	chains gunters	ch	
0x14	ell	ell	
0x15	em	em	
0x16	fathoms	fm	
0x17	feet	ft	
0x18	furlongs	fur	
0x19	inches	in	
0x1A	kilometers	km	
0x1B	league	lea	
0x1C	leagues	league	
0x1D	light years	ly	
0x1E	lines	ln	
0x1F	microns	μ	
0x20	miles nautical	mi n	
0x21	miles	mi	
0x22	millimeters	mm	
0x23	mils	mil	
0x24	nanometers	nm	
0x25	parsec	pc	
0x26	yards	yd	
<b>Mass</b>			
0x2D	kilograms	kg	
0x2E	drams	dr av	
0x2F	grains	gr	
0x30	grams	g	
0x31	milligrams	mg	
0x32	ounces	oz	
0x33	pennyweights	pwt	
0x34	pounds	lb	
0x35	kilopounds	klb	
0x36	scruples	scruple	
0x37	slug	slug	
0x38	tons long	ton	
0x39	tons metric	T	
0x3A	tonnes	tonne	
0x3B	tons short	sh tn	
0x3C	newtons	N	
0x3D	kilo newtons	kN	
<b>Force</b>			
0x41	newtons	N	
0x42	kilonewtons	kN	
0x43	millinewtons	mN	
0x44	meganewtons	MN	
0x45	crinals	crinal	
0x46	dynes	dyne	
0x47	grams force	gf	
0x48	joules per cm	J/cm	
0x49	kilograms force	kgf	
0x4A	kilograms force kp	kp	

	0x4B	kilograms meter/second <sup>2</sup>	kg ms <sup>2</sup>
	0x4C	ounces force	ozf
	0x4D	pounds force	lbf
	0x4E	poundals	pdl
	0x4F	tons force long	tonfl
	0x50	tons force short	tonfs
	0x51	tons force metric	tonfm
	0x52	kilopounds force	klbf
<b>Pressure</b>			
	0x5F	bar	bar
	0x60	atmosphere techn	at
	0x61	atmosphere phys	atm
	0x62	dyne/cm <sup>2</sup>	dyncm <sup>2</sup>
	0x63	foot of water (39°F)	ftH2O
	0x64	inch of water (39°F)	inH2O
	0x65	gigapascal	GPa
	0x66	hectopascal	hPa
	0x67	kg force / cm <sup>2</sup>	kgfcm <sup>2</sup>
	0x68	kg force / m <sup>2</sup>	kgf/m <sup>2</sup>
	0x69	microbar	μbar
	0x6A	pascal	Pa
	0x6B	newton/m <sup>2</sup>	N/m <sup>2</sup>
	0x6C	ounce(avdp)/square inch	oz/in <sup>2</sup>
	0x6D	pounds per square foot	lb/ft <sup>2</sup>
	0x6E	pounds per square inch	psi
	0x6F	tonne per square cm	T/cm <sup>2</sup>
	0x70	meters of water	mH2O
	0x71	millibar	mbar
<b>Speed</b>			
	0x78	meter/sec	m/s
	0x79	centimeters/sec	cm/s
	0x7A	feet/min	ft/min
	0x7B	feet/sec	ft/s
	0x7C	kilometers/hr	km/h
	0x7D	kilometers/min	km/min
	0x7E	kilometers/sec	km/s
	0x7F	knots	kn
	0x80	meters/hr	m/h
	0x81	meters/min	m/min
	0x82	miles/hr	mph
	0x83	miles/min	mpm
	0x84	miles/sec	mps
	0x85	nautical miles/hr	n mph
	0x86	nautical miles/min	n mpm
	0x87	nautical miles/sec	n mps
<b>Angular velocity</b>			
	0x8C	radians/sec	rad/s
	0x8D	degrees/sec	°/s
	0x8E	revolutions/minute	rpm
<b>Torsional stiffness</b>			
	0x94	newton meter/radian	Nm/rad

<b>Torque</b>			
	0x96	newton meter	Nm
	0x97	meter kilogram	m kg
	0x98	foot pound	ft lbf
	0x99	foot poundal	ft pdl
	0x9A	inch pound	in lbf
	0x9B	ounce inch	oz-in
	0x9C	milli newton meter	mNm
	0x9D	gram centimeter	g cm
<b>RMS Voltages</b>			
	0xA0	volts RMS	V RMS
	0xA1	milli volts RMS	mV RMS
	0xA2	micro volts RMS	$\mu$ V RMS
	0xA3	nano volts RMS	nV RMS
	0xA4	kilo volts RMS	kV RMS
<b>Voltages</b>			
	0xA5	volts	V
	0xA6	milli volts	mV
	0xA7	micro volts	$\mu$ V
	0xA8	nano volts	nV
	0xA9	kilo volts	kV
<b>RMS current</b>			
	0xAC	amps RMS	A RMS
	0xAD	milli amps RMS	mA RMS
	0xAE	micro amps RMS	$\mu$ A RMS
	0xAF	nano amps RMS	nA RMS
	0xB0	kilo amps RMS	kA RMS
<b>Current</b>			
	0xB1	amps	A
	0xB2	milli amps	mA
	0xB3	micro amps	$\mu$ A
	0xB4	nano amps	nA
	0xB5	kilo amps	kA
<b>RMS power</b>			
	0xB8	wattsrms	W rms
	0xB9	milliwattsrms	mW rms
	0xBA	microwattsrms	$\mu$ W rms
	0xBB	kilowattsrms	kW rms
<b>Power</b>			
	0xBC	Watts	W
	0xBD	milli Watts	mW
	0xBE	micro Watts	$\mu$ W
	0xBF	kilo Watts	kW
	0xC0	horsepower	hp
<b>Temperature</b>			
	0xC3	degrees Celsius	$^{\circ}$ C
	0xC4	degrees Fahrenheit	$^{\circ}$ F
	0xC5	Kelvin	K
<b>Counts</b>			
	0xC8	counts	counts
<b>Strain</b>			
	0xC9	strain	$\epsilon$
	0xCA	microstrain	$\mu\epsilon$
<b>Percent</b>			
	0xCC	Percentage	%

<b>Humidity</b>			
	0xCD	Relative Humidity	%RH
<b>Frequency</b>			
	0xCF	Hertz	Hz
	0xD0	kiloHertz	kHz
	0xD1	MegaHertz	MHz
	0xD2	rpm	rpm
<b>Resistance</b>			
	0xD4	ohms	$\Omega$
	0xD5	kiloohms	k $\Omega$
	0xD6	megaohms	M $\Omega$
<b>Density</b>			
	0xD8	kilograms/m <sup>3</sup>	kg/m <sup>3</sup>
	0xD9	grams/litre	g/l
	0xDA	pounds/ft <sup>3</sup>	lb/ft <sup>3</sup>
<b>Flow volume</b>			
	0xDD	liters/sec	L/s
	0xDE	meters <sup>3</sup> /sec	m <sup>3</sup> /s
	0xDF	meters <sup>3</sup> /hour	m <sup>3</sup> /hour
	0xE0	US gallon/minute	g/m
	0xE1	feet <sup>3</sup> /minute	cf/m
	0xE2	litres/minute	L/min
<b>Flow</b>			
	0xE4	kilograms/s	kg/s
	0xE5	pounds/s	lbs/s
<b>Concentration</b>			
	0xE7	meter <sup>3</sup> /meter <sup>3</sup>	m <sup>3</sup> /m <sup>3</sup>
	0xE8	litre/litre	l/l
	0xE9	foot <sup>3</sup> /foot <sup>3</sup>	ft <sup>3</sup> /ft <sup>3</sup>
<b>Concentration mole</b>			
	0xEB	moles/meter <sup>3</sup>	mol/m <sup>3</sup>
	0xEC	moles/litre	mol/l
<b>Acceleration</b>			
	0xEE	meters/sec <sup>2</sup>	m/s <sup>2</sup>
	0xEF	g-force	ga
	0xF0	foot/second <sup>2</sup>	ft/sec <sup>2</sup>
<b>Custom</b>			
	0xFB	custom unit 1	custom1
	0xFC	custom unit 2	custom2
	0xFD	custom unit 3	custom3
	0xFE	custom unit 4	custom4

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*In the interests of continued product development, Interface, Inc. reserves the right to alter product specifications without prior notice.*

