

Operating instructions



EZE20X006

Digital Strain Gauge
Measurement Amplifier

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Contents

1	Introduction & Specifications	4
2	Communications & Getting Started	5
3	Hardware & Connections	7
4	Command Protocol – Long Descriptions	8
5	Command Protocol – Short Description	17
6.	Calibration Procedure	18
7.	Use in Approved Application	19
8.	Downloading Custom Software	20

1 Introduction & Specifications

The EZE20X006 loadcell digitizing unit is a high performance device that can form the “front end” of weighing systems intended for either “approved” or industrial applications. The device feature full multi-drop communications capability and can be programmed via a straightforward ASCII command set.

The technical specifications of the unit are tabulated below :

Linearity	< 0.01 % F.S.
Excitation Voltage	5V DC
Driving Capability	1 transducer with 350 Ohm bridge
Load Cell Connection	Six-wire
Input Signal Range	2.2 mV/V nominal
Polarity	Bipolar
Input Overload	± 5V
Maximum read out	± 99999
Sample rate	1200 samples / sec - 240 updates / sec
Internal Resolution	Up to 250,000 parts (18-bit)
Dead Load	Digitally compensated
Analogue Filter	14Hz 3.order (i.e. 18 dB/oct)
Digital Filter	1 - 14Hz 2.order (i.e. 12 dB/oct)
Calibration	Software calibration and set up
Communication	RS422 or RS485 full duplex
Baudrate	9k6, 19k2, 38k4, 57k6, 115k2
Bus	Up to 32 devices on one bus (RS485)
Temperature Effect on Zero	< 30 ppm/°C
Temperature Effect on Span	< 10 ppm/°C
Temperature Range	-15°C to +50°C
Storage Temperature Range	-25°C to +80°C
Housing	Metal shield
Dimensions (L x W x H)	82 x 31 x 6 mm
Weight	Approx. 30g
Power Supply	12-24 V DC +10% -15%

2 Communications & Getting Started

Communicating with the EZE20X006 digitiser is performed via the RS422/RS485 port. The data format is the familiar 8/N/1 structure (8 data bits, no parity, 1 stop bit).

Point-to-point or multi-drop connections are supported.

Protocol Summary

The EZE20X006 digitiser are intended for use with standard PC or PLC systems, and require no special interfacing hardware and no special software adapters. The command set is based on a simple ASCII format, as per the example below:

Master (PC or PLC) sends:	OP 1	(Open the device # 1)
Slave (DEVICE) sends:	OK	(acknowledging device #1 active)
Master sends:	GG	(Get the gross weight result)
Slave sends:	G+123.45	(the gross weight with sign and Decimal point information)

Note: The complete list of available commands is printed on the page 13 of this manual.

Multi-Drop Support

A connection to the required device is opened by sending the OP xxx command, where xxx is the address of the relevant slave device, in decimal notation. The relevant device responds by acknowledging that it is active, and will then respond to any other command sent along the bus, until another OP xxx with a different address value is detected, or until a "Close Connection" command (CL) is detected.

Baudrate Settings

The EZE20X006 has a jumper SW3 for enabling a special configuration mode used for altering the baudrate and the device address. When this jumper is closed the device will enter a special baudrate search mode after power on – waiting for a space character (0x20) to be received. The time duration of this character will be measured by the DEVICE and its baudrate timing will be set accordingly – i.e. the baudrate of the terminal used will be the baudrate used by the DEVICE subsequently. The default factory setting is 9600 baud.

Address Settings

In configuration mode it is possible to set the network address of the device using the AD command to any address between 0 and 255. Setting the device address to 0 will set the continuously active mode, where the device becomes permanently active, and will listen and respond to any command on the bus, without the need for an OP xxx command. The default factory setting is 0.

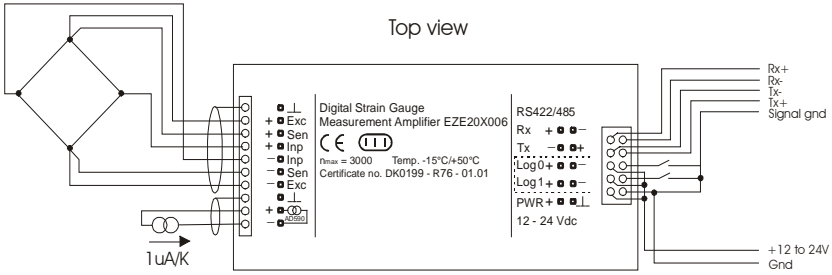
Getting Started

You will require to have available:

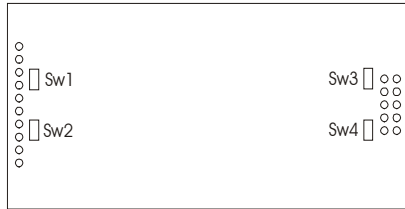
- PC or PLC with either a RS422 or RS485 communication port ;
- RS232 to RS422/485 converter - necessary if it is intended to use communication driven from the master which has only a RS232 port available;
- Interconnecting cabling - confirm that all of the relevant pins are in use - check against the wiring diagram that follows this section ;
- A load cell with test weights, OR a load cell simulator ;
- A DC power supply capable of delivering 12-24 VDC. Current capacity dependent on the number of device and the number of load cells to be connected. (One device plus one load cell requires less than 100 mA);
- One or more EZE20X006;
- A suitable ASCII communication software (HyperTerminal etc)

Refer to the following wiring diagram

3 Hardware & Connections



Bottom view



- Sw1 & Sw2 : Close for 4-wire loadcell
 Sw3 : Close to enter configuration mode
 Sw4 : Do NOT close - used for program download

4 Command Protocol – Long Description

For ease of interpretation, the commands have been grouped together and will be described in the following sequence:

- 4.1 System Diagnostics Commands
- 4.2 Calibration Commands
- 4.3 Motion Detection Commands
- 4.4 Filter Setting Command
- 4.5 Weigher Control Commands
- 4.6 Output Commands
- 4.7 Auto-Transmit Commands
- 4.8 Remote I/O Commands
- 4.9 Setpoint Operation Commands
- 4.10 Communication set-up commands
- 4.11 Save set-up Parameters Command

4.1 SYSTEM DIAGNOSTICS COMMANDS – ID, IV, IS

The following three commands provide a means of interrogating the device to confirm the type of device present, the software version of that device and the status. The commands require no parameters and are used as follows:

ID Determine the device ID code - this is a code which identifies the type of device which is currently open for communications. Issuing the ID command, which has no parameters, will return the code D:7810 This code is useful when mixed devices may be present on the bus.

IV Determines the device software version - this identifies the release of software that is installed in the device. This is useful when determining the availability of special commands or features that may have been requested for special applications. Issuing the IV command, which has no parameters, will return the software identification code in the format V:0131

IS Determine the device status - Issuing the ID command, which has no parameters, will return a result in the format S:000000 . This result comprises two 3-digit decimal values, which can be decoded according to the table below:

Leftmost 3-digit value : Rightmost 3-digit value:

1	Signal stable	1	not used
2	Zero action performed	2	not used
4	Tare active	4	not used
8	not used	8	not used
16	not used	16	not used
32	not used	32	not used
64	Output 0 active	64	not used
128	Output 1 active	128	not used

Therefore, the example result S:001000 decodes as signal stable (no-motion) no zero action and no tare.

4.2 CALIBRATION COMMANDS – CE, CM, DS, DP, CZ, CG, ZT, FD, CS

CE Set the calibration functions to the enabled state. This command must be issued PRIOR to any attempt to set the calibration parameters CM, DS, DP, CZ, CG, ZT, FD or CS. Issuing the command without any parameters results in the response E+XXXXX where XXXXX is the Traceable Access Code (TAC). This is an internal code that is used to record any changes in the calibration settings of the device. This is a critical feature that is required for “approved” applications, as it provides for the control of access to any command that has the potential of changing the weigher calibration value. For further information, please refer to section 7, “USE IN APPROVED APPLICATIONS”.

CM Set the maximum allowable output value. Lower limit 1, upper limit 99999. Issuing the command without any parameters returns the current CM value. This value will determine the point at which the output will change to 00000, signifying over-range. To set a new value for CM, the command must be preceded by the CE XXXXX command, where XXXXX is the current TAC. The new CM value required is then input as a parameter of CM, in the format CM 4010 . For further information, please refer to section 6, "CALIBRATION PROCEDURE". Factory default setting: 99999.

DS Set the display step size - this allows the output to step up or down by a unit other than 1. Permitted values are 1, 2, 5, 10, 20, 50, 100 and 200. To set a new value for DS, the command must be preceded by the CE XXXXX command, where XXXXX is the current TAC. The new DS value required is then input as a parameter of DS, in the format DS 100 . For further information, please refer to section 6, "CALIBRATION PROCEDURE". Factory default setting: 1.

DP Set the decimal point position - this allows the decimal point to be positioned anywhere between leftmost and rightmost digits of the 5-digit output result. Permitted values are 0 for the rightmost position, and 5 for the leftmost position. To set a new value for DP, the command must be preceded by the CE XXXXX command, where XXXXX is the current TAC. The new DP value required is then input as a parameter of DP, in the format DP 2 . For further information, please refer to section 6, "CALIBRATION PROCEDURE". Factory default setting: 0.

CZ Set the calibration zero point - this is the reference point for all weight calculations, and is subject to TAC control. The command returns ERR and has no action unless it is preceded by the CE XXXXX command, where XXXXX is the current TAC. Confirmation of action is provided by the return OK. For further information, please refer to section 6, "CALIBRATION PROCEDURE". Factory default setting: approx. 0mV/V input.

CG Set the calibration gain (span) value - this is the reference point for the calibration under load, and is subject to TAC control. The lower limit for CG is 1, the upper limit is 65535. The weight signal used for calibration should be as close as possible to the maximum allowable display value (CM) so as to ensure optimum calibration accuracy. A feature provided is the ability to recall the value of the calibration weight used for the current calibration by the issue of a CG command without any parameters. This is useful information for future calibration purposes or for diagnostics. When calibrating the span, the actual value of the calibration weight must be entered as a parameter of the CG command, for example if the output 25000 is required for the weight placed on the load cell, then the calibration command becomes CG 25000. The command returns "ERR" and has no updating action unless it is preceded by the CE XXXXX command, where XXXXX is the current TAC. For further information, please refer to section 6, "CALIBRATION PROCEDURE". Factory default setting: 20000 at approx. 2mV/V input.

ZT Zerotracking - this command enables or disables the zerotracking. Parameter = 0 disables the zerotracking and parameter = 1 enables the zerotracking. Issuing the command without any parameters returns the current ZT value. The command returns ERR

and has no updating action unless it is preceded by the CE XXXXX command, where XXXXX is the current TAC. Zerotracking will be performed only on results less than +/-0.5d at a rate of 0.4 d/sec where d = display step size (see DS command). The zero can only be tracked to +/- 2% of max (see CM command). Factory default setting: 0.

FD Factory default settings – this command put the DEVICE back to a known state. The data will be written to the EEPROM and the TAC will be incremented by 1.
NOTE : All calibration and setup information will be lost by issuing this command . The command returns ERR and has no updating action unless it is preceded by the CE XXXXX command, where XXXXX is the current TAC.

CS Save the calibration values - this command results in the calibration values being saved to EEPROM, and causes the TAC to be incremented by 1. The CS command saves all of the calibration group values, as set by CZ, CG, CM, DS, DP and ZT. The command returns ERR and has no updating action unless it is preceded by the CE XXXXX command, where XXXXX is the current TAC. For further information, please refer to section 6, "CALIBRATION PROCEDURE".

4.3 MOTION DETECTION COMMANDS – NR, NT

The Motion Detection facility provides a means of disabling certain functions whenever a condition of instability, or "motion", is detected. The "no-motion", or "stable" condition is achieved whenever the signal is steady for the period of time set by NT, during which it cannot fluctuate by more than NR increments. The stable condition activates the relevant bit of responses to "Info Status" (IS - see section 4.1, "SYSTEM DIAGNOSTICS COMMANDS") The functions which are disabled whenever motion is detected are "Calibrate Zero" (CZ) "Calibrate Gain" (CG) "Set zero" (SZ) and "Set tare" (ST).

NR Set the "no-motion" range - this is the range within which the weighing signal is allowed to fluctuate and still be considered as "stable". Issuing the NR command without any parameter will return the current value. Set a new value by issuing the NR command followed by the desired value, in the format NR 5. Permitted values are between the lower limit of 0 and the upper limit of 65535. Factory default setting: 1.

NT Set the stabilisation time for the "in motion" band. This is the time parameter that defines the period during which the output must not fluctuate more than NR increments in order to be considered "stable". Set a new value by issuing the NT command followed by the desired value in milliseconds, in the format NT 1000 . Permitted values are between the lower limit of 0 and the upper limit of 65535. Factory default setting: 1000.

4.4 FILTER SETTING COMMAND – FL

The facility exists for the setting of a digital filter via the command parameter FL, and this filter can be adjusted to eliminate most unwanted disturbances. Note that this filter is positioned immediately after the A/D Converter, and will therefore have an effect on all aspects of weigher operation.

FL Set the filter - permitted values are between 0 and 23, see table below. Issuing the FL command without any parameters will return the current filter value. Set a new value by issuing the FL command followed by the desired value, in the format FL 4. Factory default setting: 3.

	1Hz	2Hz	3Hz	4Hz	5Hz	6Hz	7Hz	14Hz
Gaussian	23	20	17	14	11	8	5	2
Bessel	22	19	16	13	10	7	4	1
Butterworth	21	18	15	12	9	6	3	0

The Gaussian filter will have the slowest step response and the Butterworth filter will have the fastest but with some overshoot.

4.5 WEIGHER CONTROL COMMANDS – SZ, RZ, ST, RT

The following commands provide the means to control the setting and resetting of the zero and tare points. The availability of net weighing depends on these functions. The zero point which is set at calibration time, remains the “true” zero, but the “current” zero will be the basis for the output result. Remember that the “current” zero can be influenced by the “zero tracking” function, and this should be taken into account when designing the application. A basic system control is the disabling of the “set zero” and “set tare” functions whenever the weighing signal is not stable, as defined by the “no-motion” function. Furthermore, the zero point cannot be reset if it has moved more than 2% away from the original calibration zero point, with respect to the maximum allowable display value (CM).

SZ Set the system zero - this command will create a “current” zero point which will become the basis for all weigher operation, until further updated by the zero tracking function, or another SZ command or the “reset zero” command (RZ). As previously stated, any attempt to zero a drift of more than +/- 2% of the maximum allowable display value (CM) will result in the SZ command being rejected (ERR). The SZ command is also rejected if the weighing signal is fluctuating, as defined by the “no-motion” function parameters (NR and NT). The “signal stable” bit in the responses to the “info status” (IS) command must therefore be active before a SZ command can be accepted. Issuing the SZ command, which has no parameters, will return the OK or ERR response. If OK is returned, then the “zero action performed” bit in the response to the “info status” (IS) command will be activated.

RZ Reset the zero point to the “calibration” zero - this command will return the zero point to that which was stored during the calibration procedure. Issuing the RZ command, which has no parameters, will return the OK or ERR response. If OK is returned, then the “zero action performed” bit in the response to the “info status” (IS) command will be de-activated.

ST Set the tare point - this command will activate the net weighing function, by storing the current weighing signal output value as a tare value. The ST command is rejected if the weighing signal is fluctuating, as defined by the “no-motion” function parameters NR and NT. The “signal stable” bit in the “info status” return must therefore be active before a ST command can be accepted. Issuing the ST command, which has no parameters, will return the OK or ERR response. If OK is returned, then the “tare active” bit in the response to the “info status” (IS) command will be activated.

RT Reset the tare - this command cancels the net weighing mode, and restores the current zero. The weighing signal output returns to the gross mode. Issuing the RT command, which has no parameters, will return the OK or ERR response. If OK is returned, then the “tare active” bit in the response to the “info status” (IS) command will be activated.

4.6 OUTPUT COMMANDS – GG, GN, GT, GS

The following command provides the means of obtaining an output results from the device.

GG Get the gross value - returns the current gross weight value. Issuing the GG command, which has no parameters, will return the gross weight value in the format G+01.100 .

GN Get the net value - returns the current net weight value. Issuing the GN command, which has no parameters, will return the net weight value in the format N+01.100 .

GT Get the tare value - returns the current tare weight value. Issuing the GT command, which has no parameters, will return the tare weight value in the format T+01.100 .

GS Get the A/D sample value – returns the current output result of the A/D converter (ADC). This facility is useful when developing the application, or when calibrating the system, as it allows a check to be made of the operating range of the ADC. Issuing the GS command, which has no parameters, will return the ADC output value in the format S+100000.

4.7 AUTO-TRANSMIT COMMANDS – SG, SN

The following command provide the means to output the weight results in a continuous stream, which starts upon the issue of the relevant command, and ends upon the issue of any other command.

SG Auto-transmit the gross weight value - continually returns the current gross weight value. Issuing the SG command, which has no parameters, will continually return the gross weight value in the format G+01.100 , until interrupted by any other command.

SN Auto-transmit the net weight value - continually returns the current net weight value. Issuing the SN command, which has no parameters, will continually return the net weight value in the format N+01.100 , until interrupted by any other command.

4.8 REMOTE I/O COMMANDS – IN, IO, IM, TC

The EZE20X006 includes 2 independent logic input channels, 2 independent logic output channels and a temperature sensor input, together with control features which provide the user with total control over the configuration and action of each output channel. The inputs can be read directly by the host application, allowing for such uses as machine status indication, and the outputs can be driven internally, from fully flexible setpoint controls, or can be driven directly by the host application. The following group of commands provides for reading the status of logic inputs, outputs, temperature and for configuring the outputs as internally or externally controlled.

IN Read the status of the two input channels – returns the status in the form of a bitmapped four-digit value where 0 corresponds to “false” and 1 corresponds to “true” (inputs are active “high”). Issuing the IN command, which has no parameters, returns the input status in the form IN:0001 , where Input 0 status is given by the Least Significant Digit (in this example 1) and so on.

IO Read/Modify the status of the two output channels – returns the status in the form of a bitmapped four-digit value where 0 corresponds to “false” and 1 corresponds to “true” (outputs are open drain MOSFET’s, normally open) and modifies the status if enabled by the IM command. Issuing the IO command without any parameters returns the output status in the form IO:0011, where Output 0 status is given by the Least Significant Digit and so on. Change the status of the outputs by issuing the IO command with the appropriate four-digit value in the form IO 0001, where in this example, output 0 will be activated (FET in conducting mode). Note that in normal operation, the status of the output channels is determined by the status of the internal setpoints (see section 4.9, “SETPOINT COMMANDS”), therefore setting the output channel status by means of the IO command is inhibited. However, if the IM command is used (see following), the status of the output channels can be set by the host application, through the use of the IM or IO commands.

IM In order to control the outputs from the host application the outputs must be configured using the IM command. A “1” bit in the mask will open the corresponding output

channel for outputs from the IO command and a “0” bit will leave the channel controlled by the setpoint. Issuing the IM command without any parameters returns the current mask in the form IM:0011. Change the mask by issuing the IM command with the appropriate four-digit value in the form IM 0001. NOTE: When reading back the output status using the IO command the setpoint status will be read regardless of the setting of IM.

TC Read the temperature – returns the result of the temperature measurement using the optional external AD590 temperature sensor. Issuing the TC command, which has no parameters, returns the celsius temperature in the form C+00025

4.9 SETPOINT COMMANDS – S0, S1, H0, H1, A0, A1

S0 (S1) Set the setpoint value for channel 0 (1) – sets the value which will trigger the required action of the output channel transistor, in conjunction with the settings of the other controls H0 (H1) and A0 (A1). Issuing the S0 (S1) command without any parameters will return the current value in the form 0+00200., signifying that setpoint number 0 is set to trigger at value +200, and in so doing will set output 0 “ON”. The source to be monitored for the purpose of setpoint action is determined by the setpoint ACTION command A0 (A1). After the setpoint has been reached, the action of the setpoint, and the status of the relevant output channel, is dependent on the setting of the HYSTERESIS command H0 (H1).

H0 (H1) Set the hysteresis value for channel 0 (1) – sets the value and polarity by which the output value must change in order to release the setpoint. Issuing the H0 (H1) command without any parameters will return the current value in the form 0+00100. , signifying that setpoint 0 must hold its “ON” status until the source value drops by 100. If H0 returns a negative value, then this signifies that the source value must increase beyond 100, after which point the setpoint will release, and the relevant output channel will change to the “OFF” condition. This command therefore allows the setpoint to be inverted.

A0 (A1) Set the action for channel 0 (1) – sets the source for the value which will trigger the required action of the output channel relay, according to the settings of the other controls S0 (S1) and H0 (H1). Issuing the A0 (A1) command without any parameters returns the current value in the form 0+00001

An = 0	Gross weight as setpoint source
An = 1	Net weight as setpoint source

4.10 COMMUNICATION SET-UP COMMANDS – AD, BR, DX

AD Set the address of the DEVICE for networking (0-255). Setting the device address to 0 will set the continuously active mode, where the device becomes permanently active, and will listen and respond to any command on the bus, without the need for an OP xxx command. Issuing the AD command without any parameters will return the current address. NOTE this command are only available in configuration mode. Factory default setting : 0.

BR Read the actual baudrate. Issuing the BR command without any parameters will return the current baudrate. NOTE this command are only available in configuration mode. Factory default setting : 9600.

DX Half or full duplex – this command select half or full duplex communication. Parameter = 0 select half duplex communication and parameter = 1 select full duplex communication - use half duplex setting when using two wire RS485.

4.11 SAVE SET-UP PARAMETERS COMMAND – WP, SS

The configuration parameters can be considered as three distinct groups, namely :

Calibration Parameters (CZ, CG, CM, DS, DP, ZT) ;
Indicator Parameters (FL, NR, NT, BR, AD, DX) ;
Setpoint Parameters (S0, S1, H0, H1, A0, A1);

The alteration and amendment of the calibration parameters is subject to the control procedure that is described in section 6, “CALIBRATION PROCEDURE”. This procedure includes the use of the “Calibration Save” (CS) command. All other settings can be saved using the save command WP.

WP Save the “indicator” set-up parameters - saves the settings of the “Filter” (FL) ,the “No-Motion” settings (NR, NT) and the communication settings (AD, BR, DX) in the EEPROM

SS Save the “setpoint” set-up parameters - saves the settings of the setpoints (S0 and S1), the “Setpoint Hysteresis” settings (H0 and H1) and the “Setpoint Action” settings (A0 and A1). Issuing the SS command, which has no parameters, will return OK or ERR response. The OK response signifies the “setpoint” parameters group settings have been saved to EEPROM

5 Command Protocol – Short Description

Command	Short Description	Usage	Parameter Values	Typical Response
OP	Open connection	Open device XXX	0 to 255	O:002/OK
CL	Close all connections	Close all devices (OP XXX implies CL)	none	none
ID	Inform. device ID	Information - device identification	none	D:7810
IV	Inform. version number	Information - software version number	none	V:0131
IS	Inform. on device status	Information - motion	none	S:000000
CE	Calibrate enable	Open legal parameters (CE TAC)	0 through 65535	E+00001/OK/ERR
CM	Calibrate max (TAC protected)	Read/modify max	0 through 99999	M+30000/OK/ERR
DS	Display step size (TAC protect)	Read/modify the display step size	1,2,5,10,20,50,100,200	S+00001/OK/ERR
DP	Decimal point (TAC protected)	Read/modify decimal point position	0 through 5	P+00005/OK/ERR
CZ	Calibrate zero (TAC protected)	Calibrate zero - no load on platform	none	OK/ERR
CG	Calibrate gain (TAC protected)	Calibrate gain at some load >> zero	0 through 65535	G+20000/OK/ERR
ZT	Zerotrack (TAC protected)	Zerotrack off (0) or zerotrack on (1)	0 through 1	Z:001/OK/ERR
FD	Factory default (TAC protected)	Load factory defaults into EEPROM	none	OK/ERR
CS	Calibrate save (TAC protected)	Save CM,CZ,CG,DS,DP,ZT to EEPROM	none	OK/ERR
NR	No-motion range	Read/modify No-motion range	0 through 65535	R+00010/OK/ERR
NT	No-motion time	Read/modify No-motion time in milliseconds	0 through 65535	T+00500/OK/ERR
FL	Filter setting	Read/modify filter setting	0 through 7	F+00007/OK/ERR
SZ	Set system zero	Set system zero point	none	OK/ERR
RZ	Reset system zero	Restores the calibration zero point	none	OK/ERR
ST	Set tare	Set tare point	none	OK/ERR
RT	Reset tare	Restores current zero point	none	OK/ERR
GG	Get gross value	Get gross value	none	G+01100
GN	Get net value	Get net value	none	N+00000
GT	Get tare value	Get tare value	none	T+00500
GS	Get A/D sample	Get A/D sample	none	S+100000
SG	Start auto-transmit gross	Start auto-transmitting gross weight result	none	G+01100
SN	Start auto-transmit net	Start auto-transmitting net weight result	none	N+00000
IN	Read input status	Read input status	none	I:0011
IO	Read/modify output status	Read/modify output status	0000 through 0011	O:0001
IM	Read /modify manual status	Read /modify manual status	0000 through 0011	I:M:0000
TC	Read celcius temperature	Read temperature from sensor	none	C+00025
Sn	Get/set setpoint n	Setpoint 0 or 1	-99999 through 99999	n+00000
Hn	Get/set setpoint n hysteresis	Setpoint hysteresis 0 or 1	-99999 through 99999	n+00000
An	Get/set setpoint n action	Setpoint action 0 or 1	0 through 1	n+00000
AD	Network address (config only)	Read/modify network address	0 through 255	A:014/OK/ERR
BR	Baudrate (config only)	Test baudrate setting	none	B 9600
DX	Duplex	Select half (0) or full (1) duplex	0 through 1	X:001/OK/ERR
W/P	Save set-up parameters	Save FL, NR, NT, AD, BR, DX to EEPROM	none	OK/ERR

6 Calibration Procedure

The calibration interface features a “TRACEABLE ACCESS CODE” (TAC), as is required for use in “Approved” applications (see section 7, “USE IN APPROVED APPLICATIONS” for more details). This feature also ensures that access to the calibration functions is protected from inadvertent or unauthorised change. The following parameters are considered as CALIBRATION commands :

CE : Calibration Enable - returns the current TAC value.
CZ : Calibrate zero - sets the system zero point.
CG : Calibrate gain - sets the system gain.
CM : Calibrate maximum - sets the maximum allowable display value.
DS : Display step size - sets the output incremental step size.
DP : Display decimal point - sets the position of the output decimal point.
ZT : Zerotrack enable.
FD : Factory default setting (return to)
CS : Calibration save.

To make an enquiry as to the setting of any of these commands requires the issue of the command with no parameters attached. The responses are explained in section 4.2, “CALIBRATION COMMANDS”.

To make a change to the settings of any of these commands **REQUIRES THE ISSUE OF THE CE COMMAND FOLLOWED BY THE CURRENT TAC VALUE (CE XXXXX)**. For example, if the output step value needs to be changed from 1 to 5, the following steps would be required:

Master sends : CE
Slave returns : E+00016
Master sends : CE 16
Slave sends : OK
Master sends : DS 5
Slave sends : OK

The output will now increment in steps of 5 divisions. It will then be necessary to **SAVE** the calibration parameters to non-volatile memory, by issuing the CS command. The CS command, which has no parameters and must be preceded by the CE XXXXX command, will return OK to signify successful update. The TAC is then incremented by 1. An example of the recommended calibration procedure follows:

To set the system zero and the system gain:

With the device selected, a suitable load cell in place, with known test weights available, (the example uses 5000 as a test weight value):

Step 1	Master sends :	CE	Query the current TAC value
	Slave returns :	E+00017	
Step 2	Master sends :	CE 17	Enables the calibration sequence
	Slave returns :	OK	
Step 3	Master sends :	CZ	Ensure that the weigher is unloaded
	Slave returns :	OK	
Step 4	Master sends :	CE 17	Enables the calibration sequence
	Slave returns :	OK	
Step 5	Master sends :	CG 5000	Where 5000 is the weight value added
	Slave returns :	OK	
Step 6	Master sends :	GG	To confirm the calibration is correct
	Slave returns :	G+05000.	
Step 7	Master sends :	CE 17	Enables the calibration sequence
	Slave returns :	OK	
Step 8	Master sends :	CS	Writes the calibration data to memory
	Slave returns :	OK	

The system zero and system gain value will have been updated and written to EEPROM, and the TAC will have been incremented.

6 Use in “Approved” Applications

The term “approved” applies whenever the weighing application is intended to be used for “legal-for-trade” weighing - that is, money will change hands according to the weight result. Such applications are bound by the legal metrology regulations of the relevant governments around the World, but most countries will comply with either the relevant EN’s (EuroNorms) or the relevant OIML (Organisation Internationale de Metrologie Legale) recommendations.

- The EZE20X006 has been approved as a component for use in weighing systems according to OIML recommendation R76, the highest performance level approved being Class III, 3000 division. The approval Authority was the Danish Electronics, Light & Acoustics (DELTA), and the approval certificate number was
- DK0199-R76-01.01, dated 23.03.01. This approval will allow the use in approved weighing systems throughout Europe, and in many other countries of the World.

To achieve approval on a particular application, it will be necessary to satisfy the relevant Governmental Trading Standards Authority that the requirements of the various rules and regulations have been satisfied. This task is greatly simplified if the key components of the

weighing system, namely the load cells and the weighing indicator or digitiser, are already approved as “components”.

Usually, a discussion with the Weighing Equipment Approvals Officers at the relevant National Weights & Measures Office will then reveal the extent of any pattern testing that may be necessary to ensure compliance.

Restrictions upon usage when in “Approved” applications

A number of performance restrictions must come into force. These restrictions are the number of display divisions, which become limited to 3000 divisions, and the sensitivity per display division, which becomes 1 μV per division.

Once installed in the application, an “approved” application will require “stamping” by an Officer of the relevant Governmental Trading Standards Department. This certifies the equipment or system as being in accordance to the relevant regulations and within calibration limits.

The Traceable Access Code (TAC)

The user software must then provide a guard against improper access of the calibration commands (see the “Calibration Commands” section). The EZE20X006 digitiser features the “Traceable Access Code” or TAC method of controlling the access to the calibration commands group. This means that a code is maintained within the device, and is incremented whenever any change to any of the calibration commands is saved.

When performing the “stamping” test, the Trading Standards Officer will make a note of the TAC, and advise the user that any change to this code which occurs prior to the regular re-inspection by the Trading Standards Office, will result in legal prosecution of the user.

The user software is required as a condition of approval, to make the TAC available to the weight display indicator or console, on demand.

6 Download Custom Software

For downloading customized software or updates the DEVICE must be connected to a PC running Windows through a suitable RS485/RS422 converter using 4 wire connection. The jumper SW4 must be closed before powering up the DEVICE to enter this special download mode.

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