

IQ 700IS

Intrinsically Safe Weight Indicator

NOTE: IQ 700IS control drawings are not included in this PDF version of the manual.

Installation Manual



Contents

About This Manual	1
1.0 Introduction	1
1.1 Factory Mutual Approval	1
1.2 System Limitations and Restrictions	1
1.3 Front Panel Keypad and Annunciators	2
2.0 Installation and Wiring	4
2.1 Hazardous Area Installation of the IQ 700IS	4
2.2 Cable Requirements	4
2.3 AC Power Wiring	5
2.4 Battery Option	5
2.5 Instrumentation Setup	6
2.6 Load Cell Wiring	7
2.7 Serial Port Wiring	8
3.0 Configuration	9
3.1 Digital Configuration	9
3.1.1 Parameter Overview	9
3.1.2 Configuration Procedure	9
3.1.3 Digital Configuration Parameters	9
3.2 Serial Configuration	13
3.3 Options Configuration	14
3.3.1 Option 1 – Expanded Resolution	14
3.3.2 Option 2 – Analog Output	14
3.3.3 Option 3 – Time and Date	16
3.3.4 Option 4 – Auto Shutoff Mode	17
3.3.5 Option 6 – Five-Point Linear Calibration	17
3.3.6 Option 7 – Smart Serial I/O	18
3.4 Setting Up Custom Transmits (Smart I/O)	18
3.4.1 Enabling Option 7	18
4.0 Calibration	24
4.1 Zero Calibration	24
4.2 Single Slope Span Calibration	24
4.3 Five-Point Linear Calibration	25
5.0 Normal Weighing Mode Operations	26
5.1 Display Test	26
5.1.1 Display Check	26
5.1.2 EPROM Verification	26
5.2 LED Annunciators	26
5.3 Function Keys	26
5.4 Gross/Tare/Net Weighing Operations	26
5.4.1 Display Mode on Power Up	26
5.4.2 ZERO Key Function	26
5.4.3 TARE Key Function	27
5.4.4 Overload and Underrange Conditions	27
5.4.5 Lb/Kg Conversion	27
5.5 Fixed Tare Entry	27
5.6 Serial Output	27
5.6.1 Serial Data Formats	27
5.6.2 Demand Mode versus Continuous Data Output	29

6.0	Appendix	30
	6.1 Error Messages	30
	6.2 ASCII Character Chart	31
	6.3 Specifications	32
	IQ 700IS Limited Warranty	35

About This Manual

The IQ 700IS indicator represents the latest in state-of-the-art microprocessor technology specifically applied to the weighing marketplace. This manual provides information on installation, calibration, configuration and operation of the IQ 700IS. The installer should be familiar with the National Electrical Code and RP 12.6 (*Recommended Practice*) requirements for installation of equipment in hazardous areas (NEC Article 504, *Intrinsically Safe Systems*) published through the Instrument Society of America.



Warning *The IQ 700IS is a Factory Mutual-approved system. This approval is valid only if the installation conforms to the guidelines described in this manual. If modifications are made to the installation procedure, the enclosure is opened, or the instrumentation is changed in any way, Factory Mutual approval is void and the customer becomes fully responsible for such modifications.*

This instrument and accompanying equipment must be installed and serviced by an authorized technician in accordance with the instructions provided in this manual. Improper specification, installation, or service of this equipment could result in personal injury or property damage.



Authorized distributors and their employees can view or download this manual from the Rice Lake Weighing Systems distributor site at www.rlws.com.

1.0 Introduction

The IQ 700IS is a single-channel digital weight indicator designed and approved to operate as an intrinsically safe system in a wide variety of scale and weighing applications. The indicator is housed in a NEMA 4X stainless steel sealed case. The standard unit is equipped with a tilt stand base for tabletop or wall mounting applications. The indicator front panel consists of a 21-button keypad, six seven-segment display digits and 11 LED annunciators (see Figure 1-1 on page 2).

Features of the IQ 700IS include:

- Full front panel digital configuration and calibration
- Zero and span temperature compensation to ensure compliance with NTEP temperature range requirements (-10 to 40°C)
- Nonvolatile memory stores data for calibration, temperature compensation, configuration parameters, auto or fixed tare values, PAZ and AZM values
- Ten-thousand displayed graduations; 80,000 graduation expansion available

NOTE: Use of more than 20,000 graduations may cause undesirable display instability in some applications.

- Analog sensitivity to 0.3 $\mu\text{V}/\text{grad}$ at 20,000 graduations
- Ten updates per second, with selectable digital averaging and auto averaging; 5 Hz active analog filter for smooth response

- Excitation for four 350 Ω load cells at 5 VDC
- Operable from DC power supply or optional battery
- Time and date print selection

1.1 Factory Mutual Approval

The IQ 700IS is Factory Mutual (FM) approved for:

- Classes I, II, and III,
- Divisions 1 and 2, and
- Groups A, B, C, D, E, F and G

The Factory Mutual (FM) approval is a system approval for all devices connected directly to the IQ 700IS digital weight indicator. Other devices that have FM Entity Approval cannot be used with this system unless specifically listed in this manual as part of the Rice Lake Weighing Systems Factory Mutual systems approval. Failure to comply with this voids the FM approval. The control drawing is the guide to the installation of this system.

1.2 System Limitations and Restrictions

The following items represent limitations and restrictions on the use of the IQ 700IS:

- All instrumentation must have identification nameplates in compliance with the control drawing.
- All wiring, connections, conduit and grounds

must comply with the National Electrical Code.

- The cable type and cable length must comply with the specifications in the control drawing
- No modifications can be made in the field.
- Factory Mutual Approval required (see Section 1.1 on page 1).

- It is mandatory to return the IQ 700IS to Rice Lake Weighing Systems for service.
- Component level repair is not permitted on Factory Mutual Approved equipment.
- Standard unit configuration is without local sense jumpers installed. Therefore, use either six-conductor loadcell cable or externally jump +SEN to +EXC and -SEN to -EXC.

1.3 Front Panel Keypad and Annunciators

Figure 1-1 shows the IQ 700IS front panel. The IQ 700IS display consist of a six seven-segment display digits. Table 1-1 lists the front panel keys and their functions.

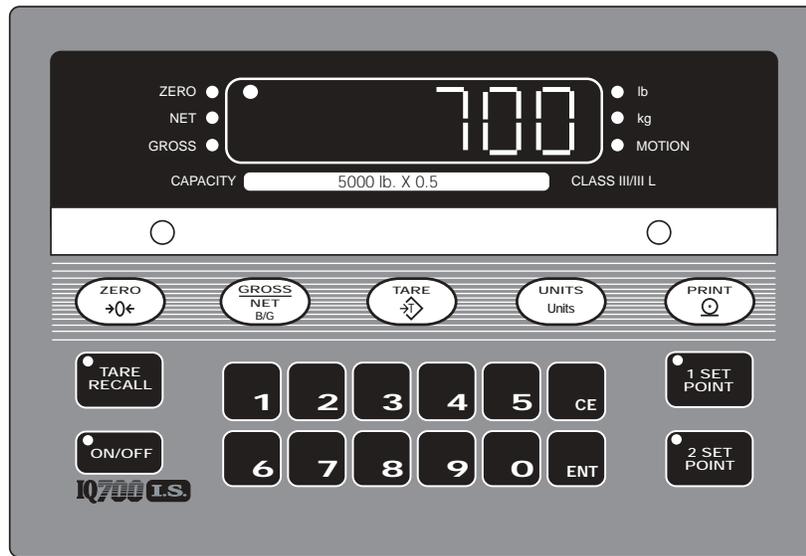


Figure 1-1. IQ 700IS Front Panel

Panel Key	Function
ZERO	Provides push-button auto zero (PAZ) over $\pm 1.9\%$ or 100% full scale capacity. Operates only in gross weighing mode.
GROSS/NET	Switches the unit between gross and net weighing modes.
TARE	Provides push-button tare entry over 100% of scale capacity. Pressing TARE key switches to net mode and enters tare.
PRINT	Provides a manual print function if unit is wired to serial printer or other data device. Also initiates truck in/out weighing function if that feature is enabled. See paragraph 6.6 for serial output specifications.
UNITS	Switches the displayed weight unit between pounds and kilograms.
TARE RECALL	Press to recall tare value; LED annunciator lit when tare value is displayed. Also used as ID RECALL in truck weighing mode.
ON/OFF	Provides power to the indicator.
SETPPOINT 1 & 2	No function. Setpoints are not supported for this indicator.
0-9, CE, ENT	Numeric keyboard for entry of manual tare and calibration data. Includes CE (Clear Entry) and ENT (Enter) keys.

Table 1-1. Front Panel Key Functions

Table 1-2 summarizes the front panel annunciator functions.

Annunciator	Function
LOW BATTERY	On when DC output voltage drops below normal operating range.
ZERO	On when scale weight is within ± 0.25 displayed graduations of zero. Used in gross weighing mode only.
NET	On when the indicator is in net weighing mode.
GROSS	On when the indicator is in gross weighing mode.
lb/kg	lb or kg LED is lit to show the current displayed weight units.
MOTION	On when scale is in motion.
1 SETPOINT 2 SETPOINT	No function.
TARE RECALL	Part of the TARE RECALL key, LED flashes when tare value is displayed.
ON/OFF	On during display check.

Table 1-2. Front Panel Annunciators

2.0 Installation and Wiring

This section describes the procedures for installing the IQ 700IS indicator, including load cell, digital input and serial communications cabling.

2.1 Hazardous Area Installation of the IQ 700IS

The following information is provided to help the installer use the correct conduit and load cells for installation of the IQ 700IS.

Drawings Required for this Installation

Table 2-1 shows the IQ 700IS control drawing numbers and titles. The IQ 700IS drawings are included in the back of this manual.

Control Drawing	Title
33476, Sheet 1	Cable Wiring
33476, Sheet 2	Interconnect Diagram
33476, Sheet 3	Interconnect Diagram, Battery Operated
33476, Sheet 4	Standard Unit Dimensions
33476, Sheet 5	Battery Powered Unit Dimensions
33476, Sheet 6	Unit Mounting Diagrams

Table 2-1. IQ 700IS Drawing Number Identification

2.2 Cable Requirements

Intrinsically safe cables used in the hazardous area are specified on the Control Drawing 33476, Sheet 2.

Since all cables have internal inductance and capacitance, only the cables listed are safe to use with this intrinsically safe system (Figure 2-1). Table 2-2 on page 5 provides specifications for maximum cable length based on Group classification. A list of Factory Mutual Approved cables is shown in Table 2-3 on page 5.

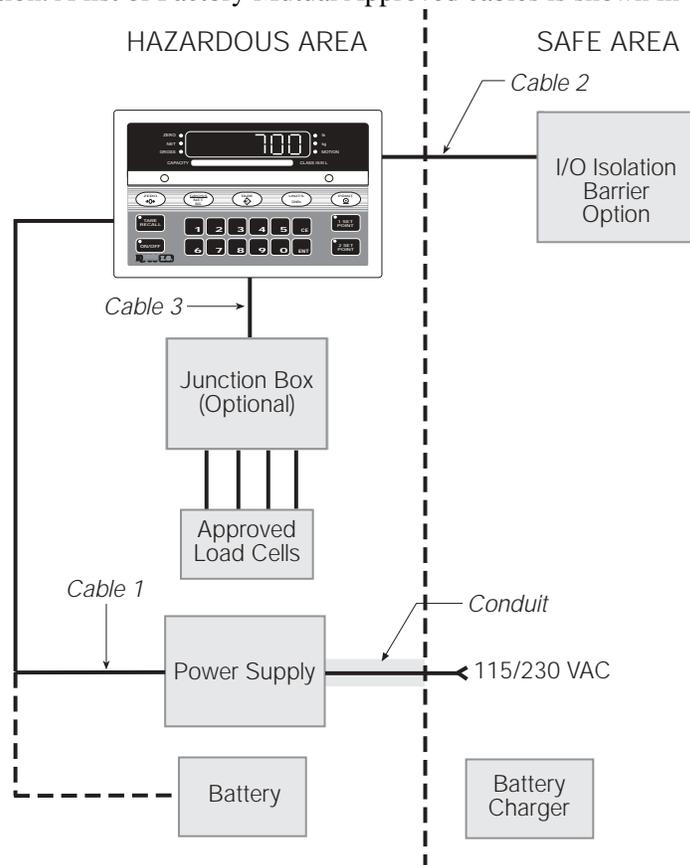


Figure 2-1. Intrinsically Safe System Diagram

Maximum Cable Length,		
Group	Cable 1	Cables 2 & 3
A, B	75'	800'
C	300'	
D	500'	

Table 2-2. Maximum Cable Lengths

 **Caution** Use only Factory Mutual Approved cables.

Factory Approved Cable			
Cable	Type	RLWS PN	Cable Length, ft
1	Power	31212	10
		48690	25
		48691	100
		48692	500
2	Serial I/O	36448	10
		48687	25
		48688	100
		48689	500
3	Load Cell	36444	10
		44313	25
		44314	50
		44315	75
		44316	100
		44317	200
		44318	300
		44319	400
	44320	500	

Table 2-3. FM Approved Cable Lengths

Conduit System (Supplied by Customer)

AC Line Voltage Feed: The power supply AC line voltage feed must be run through conduit and be properly sealed. The installer must comply with RLWS installation drawings as well as the National Electrical Code for installation of equipment in hazardous areas (NEC Article 504, *Intrinsically Safe Systems*).

Power Supply to Indicator: Conduit is not required for this installation. However, a separate conduit system is recommended. The type suggested for this application is 3/4 inch rigid steel conduit with pull boxes located at required intervals. The conduit provides additional noise protection for the low level signals, while automatically complying with the requirements for 2 inch separation between intrinsically safe circuits and other electrical cables. Conduit seals are required where a gas tight seal is required between the hazardous area and the safe area.

To protect the watertight integrity of the I/O barrier and junction box, the conduit should terminate adjacent to the respective enclosure with a union providing the proper thread to accept a Hubbel or Crouse Hinds cord connector for the cable to exit the conduit. All conduit, fittings and conduit accessories are provided and installed by the customer.

NOTE: The customer is responsible for the correct installation of all conduit seals in compliance with all National Electrical Code regulations.

2.3 AC Power Wiring

Standard units are powered by one of these two options:

- 115 VAC into RLWS DC output power supply (RLWS PN 33476)
- 230 VAC into RLWS DC output power supply (RLWS PN 33477)

2.4 Battery Option

The optional battery package provides an intrinsically safe battery pack that can replace the power supply. The battery is approved for use in hazardous environments and provides up to 50 hours of continuous operation in a four by 350Ω load cell system. The battery pack is ideal for limited use operations such as bench scales and platform scales. A low battery LED annunciator indicates when the battery needs to be recharged (see Figure 2-2). The recommended initial battery charge time is 14 hours.

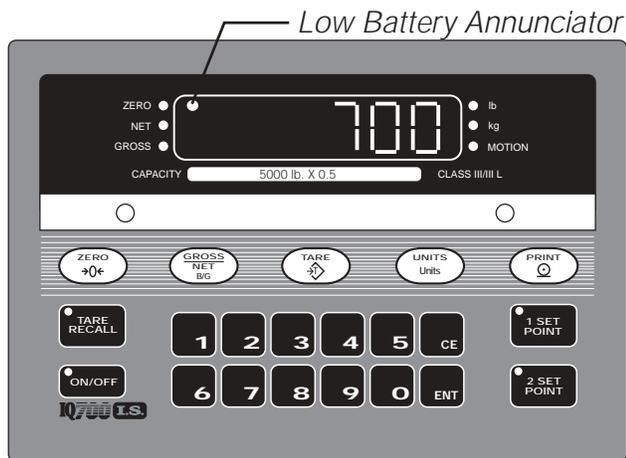


Figure 2-2. Low Battery LED Annunciator

The battery pack is designed for easy removal and can be recharged in a safe area in 8 hours or less. The indicator also contains an auto shutoff to power off the indicator when not in use. An optional battery charger is available from RLWS.



Caution

All wiring must be done by qualified personnel and meet all appropriate safety and NEC electrical codes as noted on RLWS Control Drawing 33476.

2.5 Instrumentation Setup

All indicators are configured and tested prior to shipment to ensure that they are fully functional. The unit can be turned on immediately after connecting the input power and the load cells.

The IQ 700IS operates with the EPROM program KDA--49 (27C512). To verify the program installed in the indicator, turn on the indicator and observe the displayed value at the EP prompt (see Figure 2-3). The EP prompt displays the family, set, and version level of the installed EPROM.

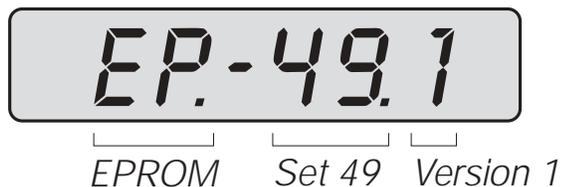


Figure 2-3. Example of EPROM Display

To ensure that the IQ 700IS is in proper operating condition, the indicator can be tested in a safe area with a load cell simulator. The input signal should be as close as possible to the normal system millivolt value. Figure 2-4 shows the simulator-to-indicator wiring connection in a six-wire configuration. See Section 2.6 on page 7 for more information.

NOTE: Six-wire configuration requires that the +SEN lead be jumpered to +EXC and the -SEN lead be jumpered to -EXC at the simulator only.

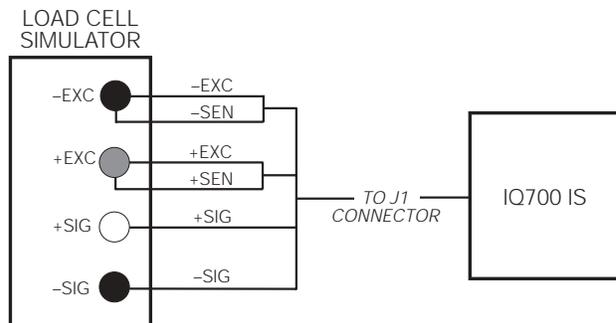


Figure 2-4. Wiring Connection to Simulator



Caution

Exceeding rated load cell load or shortening excitation wires may damage power supply.

NOTES:

- Test weights or a water meter calibration can be used to verify scale performance.
- The tilt stand should be secured with 1/4-20 inch screws. The location should be selected to offer some degree of protection for the indicator and its associated hardware.
- Unprotected cable runs need to be installed in a method to protect the cable from damage.
- All wiring must conform to the National Electrical Code and RP 12.6.

See control drawing 33476, Sheet 2, in the back of this manual for system interconnection details.

2.6 Load Cell Wiring

All units are equipped with a six-wire load cell connector. RLWS supplies load cell cable in various lengths (see Table 2-3 on page 5). One end of the cable attaches to the indicator; the other end has stripped and tinned wires for connection to a junction box. The IQ 700IS is supplied with a blank six-pin connector that can be attached to existing load cell cables by the installer.

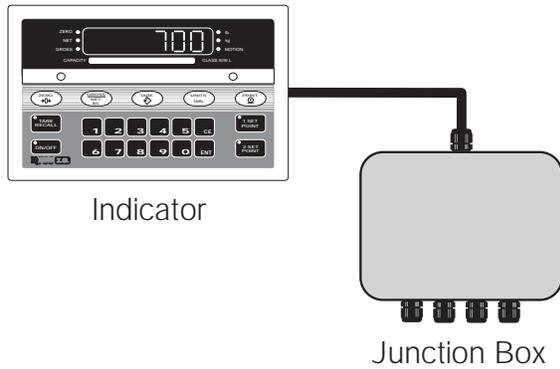


Figure 2-5. Load Cell Wiring

Figure 2-6 shows the load cell output connector and the location of J1 on the back of the indicator. Table 2-4 shows load cell connector pin assignments.

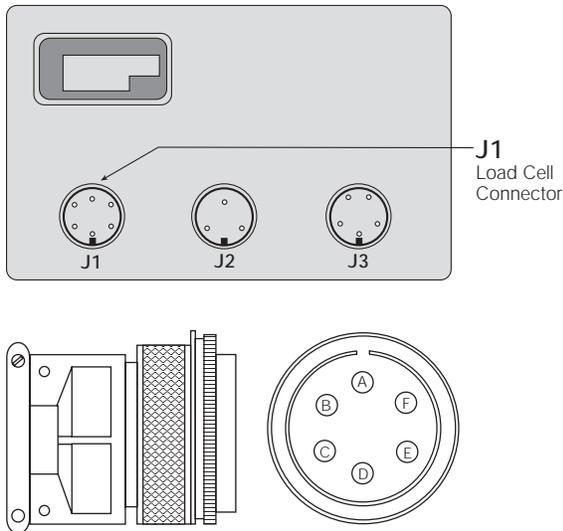


Figure 2-6. J1 Load Cell Connector-facing

Pin	Function
A	+EXCITATION
B	-EXCITATION
C	+SIGNAL
D	-SIGNAL
E	+SENSE
F	-SENSE

Table 2-4. Load Cell Connector Pin Assignments

For four-wire load cell connections, jumper the sense lines to the excitation lines as shown in Figure 2-7.

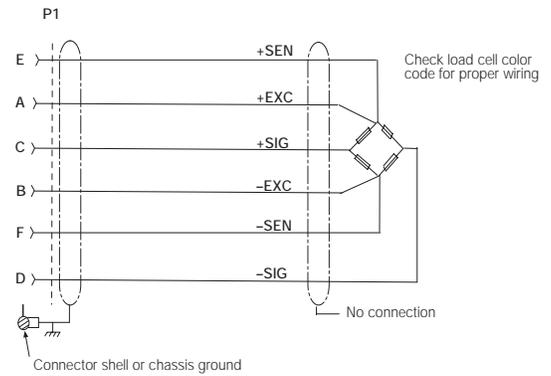
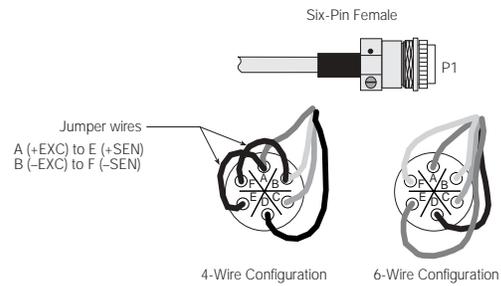


Figure 2-7. Load Cell Wiring

2.7 Serial Port Wiring

Serial Port 1 is a bidirectional (full duplex) port supporting active 20 mA current loop communications. Port 1 is optically isolated through the intrinsically safe I/O barrier.

The IQ 700IS serial port can be configured to communicate directly to a printer, remote display, or other device using 20 mA communications through the I/O interface barrier (see Figure 2-8). Since the I/O barrier is not powered (totally passive), the receiving device must also provide an active 20 mA current loop interface to retrieve data from the I/O barrier.

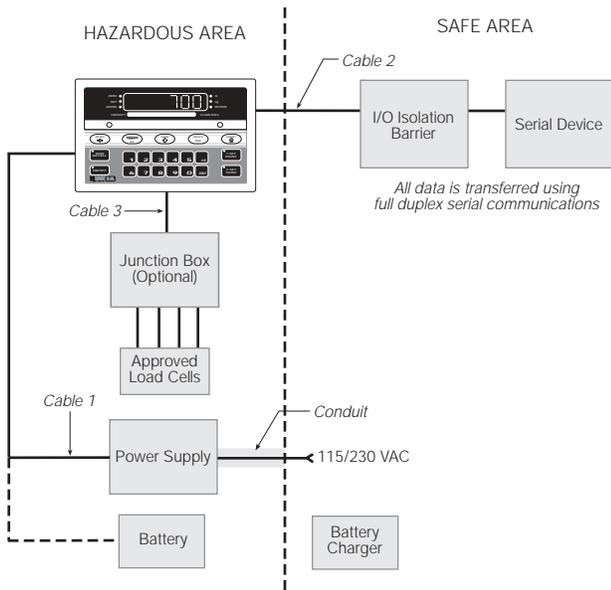


Figure 2-8. Intrinsically Safe System using Serial Communications

NOTE: The serial communications capability of the IQ 700IS is dependent on the product specifications of the receiving device. All serial communications applications should be tested with the I/O barrier in place.

Access to this serial communication port is through the five-pin female connector (J3) located on the back of the IQ 700IS indicator (see Figure 2-9). See the output connector diagram in Figure 2-9 and Table 2-5 for connector and wire identification.

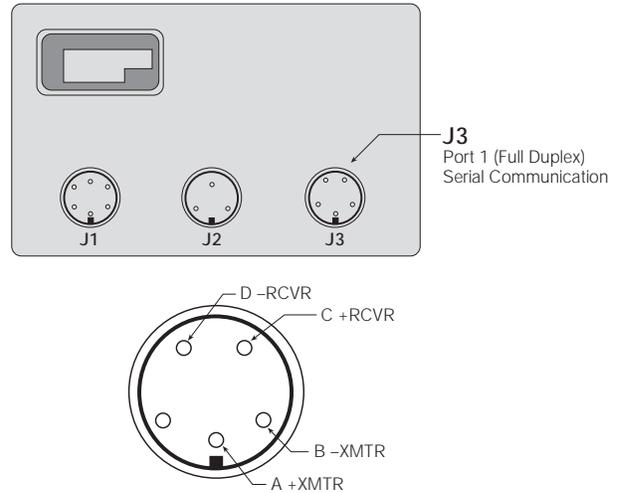


Figure 2-9. Serial Port, J3 Connector

J3 Pin	Color	Function	I/O Barrier		End Unit
			TB4	TB5	
A	White	+XMTR	21	28	RXDCL+
B	Blue	-XMTR	22	27	RXDCL-
C	Red	+RCVR	23	26	TXDCL+
D	Black	-RCVR	24	25	TXDCL-
E	—	—			
—	Violet	SHIELD			

Table 2-5. Serial Port Connector Wiring

3.0 Configuration

Prior to calibration, the IQ 700IS must be digitally configured, or assigned a set of operating parameters. The first three parameters are directly related to calibration and must be set before proceeding to calibration mode.

3.1 Digital Configuration

3.1.1 Parameter Overview

Table 3-1 on page 10 lists configuration parameters and describes their values. The following paragraphs give the procedure for configuring the IQ 700IS.

3.1.2 Configuration Procedure

1. Unscrew the two screws on the face plate bracket (See Figure 3-1). The bracket drops down, exposing four program switches on the left.

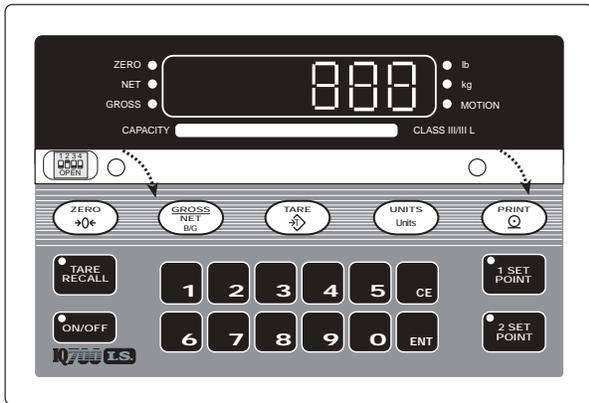


Figure 3-1. Accessing the Program Switches

2. Temporarily remove the unit's flexible black display panel by gently pushing down and lifting the panel up and out at its center to expose the configuration and calibration instructions printed on the surface below. The switch function table defines the appropriate front panel switch settings for the CONF and CAL modes.
3. Close switch SW1-2, marked CONF (2), by moving to the up position (see Figure 3-2). A prompt appears with a parameter number and data value.

The parameter identifier is a number, 1–14, that correlates to the CONFIG chart on the upper left of the switch map panel. Selected data represents the value being entered into the unit configuration data. For example, 1 100 sets the indicator to 10,000 graduations (see Table 3-2 on page 10).

When configuration is complete, set SW1-2 open (down) to return the unit to normal operating mode.

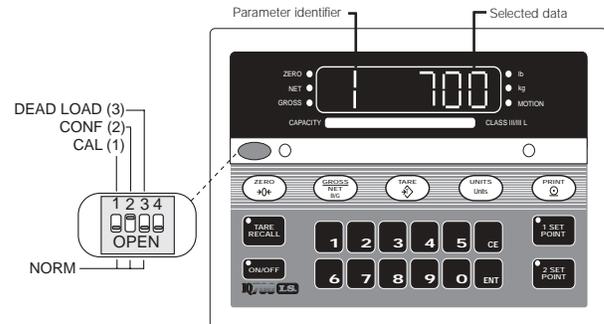


Figure 3-2. Closing Switch 2

The function keys shown in the table in Figure 3-3 have alternate functions during digital configuration.

Zero	Net/Gross	Tare	Units
Parameter Select	Parameter Data Select	Subparameter Select	Subparameter Data Select

Figure 3-3. Front Panel Key Functions

NOTE: The TARE RECALL key functions as a previous screen key in CONFIG mode.

3.1.3 Digital Configuration Parameters

Table 3-2 on page 10 lists the configuration display prompts (Prompt 1) and their value selections for displayed graduations. Prior to calibration, the IQ 700IS must be digitally configured, or given its set of operating parameters. The first three parameter selections are directly related to calibration and must be set up before proceeding to the calibration mode. These parameters include the number of graduation, the resolution, and the decimal point location in the weight data, all of which define the scale capacity.

Table 3-3 lists Prompts 2 and 3 and Table 3-4 has Prompts 5, 6, and 7. Prompts 8, 9, and 10 are shown in Table 3-5 and Prompts 11 through 14 are listed in Table 3-6.

Parameter	Description	Values
1	Graduations	NTEP to 10,000 (80,000 available).
2	Display resolution	1, 2, 5, 10, 20, 50, 100
3	Decimal point	0.0, 0.00, 0.000, 0.0000
4	Span select	Parameter 4 is not configurable: Span selection is automatically set for the following ranges: Lo = 1.7 – 3.3 mV/V; Hi = 0.5 – 2.0 mV/V
5	Digital averaging	1, 2, 4, 8, 16, 32, A1 = 8-4-2; A2 = 16-8-4
6	Tare mode	ATNR, AUTO, FIXED, BOTH (inhibit with motion)
7	AZM band	Off, 0.5, 1, 3, 5, and 10 divisions Use 0.5 for H-44, bench, counter and livestock applications; use 3 for vehicle, axle-load, and railroad scales
8	AZM/PAZ aperture	±1.9%, 100% of capacity includes push-to-zero, H-44: 1.9%
9	Motion	Off, 1, 3 divisions H-44: vehicle, axle, livestock, RR, 3.0; all other 1.0
10	Displayed units	Lb and kg conversion
11	Setpoint mode	Not supported
12	Zero band	Not supported
13	Weigh mode	Not supported
14	Serial output	Port 1, demand, continuous, baud rate, G/T/N, or display

Table 3-1. Parameter Overview

Prompt Display	Interpretation	Notes
Displayed Graduations		$\text{Number of Graduations} = \frac{\text{Scale Capacity}}{\text{Resolution}}$ <p>Legal for trade values: 500–10000 (Refer to Paragraph 4.3)</p>
1 5	500	
1 10	1000	
1 15	1500	
1 20	2000	
1 25	2500	
1 30	3000	
1 40	4000	
1 50	5000	
1 60	6000	
1 80	8000	
1 100	10000	
1 120	12000		Not valid in legal-for-trade applications
1 140	14000	
1 160	16000	
1 180	18000	
1 200	20000	

Table 3-2. Configuration Display Prompt 1

Prompt Display		Interpretation	Notes
1	300	30000	Not valid in legal-for-trade applications These selections available only if Option 1 (Expanded Resolution) is enabled
1	400	40000	
1	500	50000	
1	600	60000	
1	700	70000	
1	800	80000	

Table 3-2. Configuration Display Prompt 1 (Continued)

Prompt Display		Interpretation	Notes
Resolution / display divisions			$Scale\ capacity = displayed\ graduations \times resolution$
2	1	1	Resolution is determined by the combination of Parameters 2 and 3. For example: <ul style="list-style-type: none"> If Parameter 2 = 1 and Parameter 3 = 0.00, display resolution is 0.01 If Parameter 2 = 5 and Parameter 3 = 0.0, display resolution is 0.5 If Parameter 2 = 10 and Parameter 3 = 0, display resolution is 10 • (Refer to Paragraph 4.3) <ul style="list-style-type: none"> •
2	2	2	
2	5	5	
2	10	10	
2	20	20	
2	50	50	
2	100	100	
Decimal Point Location			
3	0	No decimal point	
3	0.0	xxxxx.x	
3	0.00	xxxx.xx	
3	0.000	xxx.xxx	
3	0.0000	xx.xxxx	

Table 3-3. Configuration Display Prompts 2 – 3

Prompt Display		Interpretation		Notes
	Digital Averaging	No. Averages	Update Rate	
5	1	1	10/sec	
5	2	2	5/sec	
5	4	4	2.5/sec	
5	8	8	1 sec	
5	16	16	2 sec	
5	32	32	4 sec	
5	A1	8-4-2	Variable	
5	A2	16-8-4	Variable	

Table 3-4. Configuration Display Prompts 5 – 7

Prompt Display	Interpretation	Notes
Tare Enable		Selection of either fixed tare (Ft) or fixed tare and auto tare both in Parameter 6 allows up to a six digit fixed tare entry to be made using the numeric front panel keys or, when configured for full duplex serial communication, a fixed tare entry can be down loaded through the serial port.
6 Atnr	Auto (stored) tare only – no recall	
6 AUto	Auto (stored) tare only	
6 Ft	Fixed (manual) tare only	
6 both	Auto or fixed tare	
AZM Capture Band (Displayed Grads)		
7 oFF	Off	
7 0.5	±0.5	
7 1	±1.0	
7 3	±3.0	
7 5	±5.0	
7 10	±10.0	Selection available when Option 1 is enabled

Table 3-4. Configuration Display Prompts 5 – 7 (Continued)

Prompt Display	Interpretation	Notes
AZM/PAZ Aperature		
8 1.9	±1.9% of full scale	
8 FS	100% of full scale	
Motion Band		
9 oFF	Off	
9 1	±1.0	
9 3	±3.0	
9 5	±5.0	
9 10	±10.0	
9 20	±20.0	Selections available when Option 1 is enabled
9 50	±50.0	
Display Base (lb/kg)		lb/kg CONV key functions only if Parameter 10 is set to 10 Con
10 lb	lb display only	
10 kg	kg display only	
10 Con	lb (base) conversion	

Table 3-5. Configuration Display Prompts 8 –10

Prompt Display	Interpretation	Notes
11	Setpoint mode	Not supported; Ensure OFF
12	Zero band control output	Not supported
13	Truck mode	Not supported; Ensure NORM
14	Serial configuration	Section 3.2 on page 13

Table 3-6. Configuration Display Prompts 11 – 14

3.2 Serial Configuration

Serial Port 1 is an ASCII-compatible, 20 mA current loop output. Port 1 output can be disabled, set for demand mode, or set to continuous output data.

Table 3-7 shows the configuration selections for Parameter 14, which controls the configuration of Port 1. There is no external access to Port 2 and it should therefore be disabled (Parameter 14.5 set to OFF).

NOTE: *RS232 communication is not available from IQ700IS. If RS232 is required, it is recommended that Analog Option P/N 19578 be ordered and have U14, C6, C7, C8 and C9 installed.*

Parameter	Subparameter	Interpretation
14.	oFF	Serial communications disabled
14.	S1	Port 1: simplex
14.	dU	Port 1: duplex
14.1	Demand print configuration in net mode	
	14.1Gtn	Three-line output G-T-N
	14.1nEt	Single line, net print
14.2	Delay after carriage return (CR) enabled	
	14.2 oFF	No delay after CR
	14.2 1	1 second delay after CR
	14.2 2	2 second delay after CR
	14.2 3	3 second delay after CR
	14.2 4	4 second delay after CR
14.3	Port 1 configuration	
	14.3 oFF	Port 1 disabled
	14.3 dE	Demand output
	14.3 Co	Continuous output
14.4	Port 1 baud rate	
	14.4 3	300 bps
	14.4 6	600 bps
	14.4 12	1200 bps
	14.4 24	2400 bps
	14.4 48	4800 bps
	14.4 96	9600 bps
14.5	Port 2 configuration	
	14.5 oFF	Port 2 disabled

Table 3-7. Parameter 14 Configuration Prompts

3.3 Options Configuration

The IQ 700IS offers a selection of optional features that are available in the configuration of the indicator. The options setup mode allows the operator to expand the capabilities of the indicator. The available options are:

- Option 1 - Expanded resolution
- Option 2 - Analog output
- Option 3 - Time and date
- Option 4 - Auto shutoff
- Option 6 - Five-point linearization
- Option 7 - Smart serial I/O

To access digital option configuration, close switches SW1-2 and 1-3 (Figure 3-4). If the option mode has been enabled, selections are available. If the option mode is not enabled (all options turned off), dashes appear across the display (-----). Press and hold the ENT key until *Option* appears on the display.

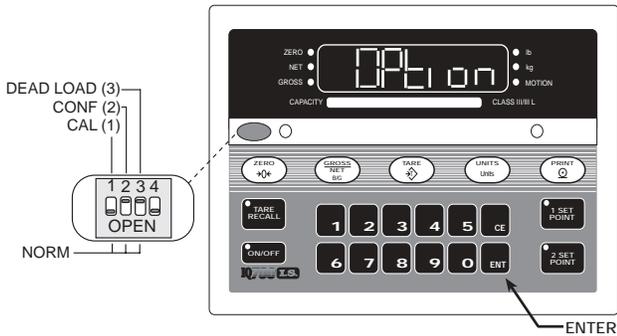


Figure 3-4. Close Switches SW1-2 and 1-3 for Option Configuration

In the option mode, primary function keys (ZERO, GROSS/NET, etc.) operate as secondary function keys (Figure 3-5).

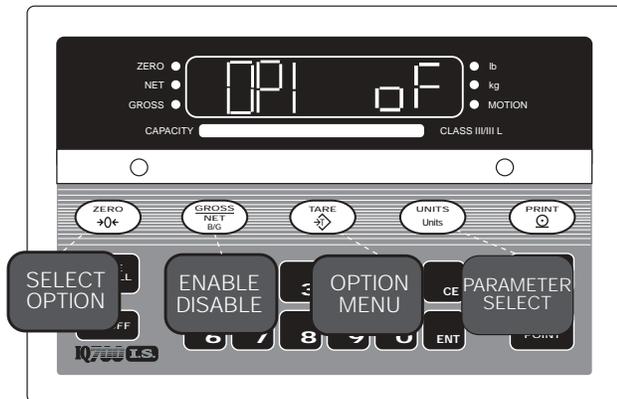


Figure 3-5. Front Panel Keys with Alternate Functions in Options Menu

Use the ZERO key to select Options 1, 2, 3, 4, or 6 or the TARE RECALL key to scroll backward through the options. To enable a selected option, use the GROSS/NET key.

Some options, once enabled, may have an option submenu available. Use the TARE key to access the option submenu. To make parameter selections in the Option submenu, use the UNITS key. Display prompting is provided in each case.

Key Functions Summary

Use the list below as a quick reference when selecting and configuring the options.

- ZERO – Increments option number
- NET/GROSS – Turns options ON/OFF
- TARE – Steps through subparameters or functions as ENTER for numeric changes
- UNITS – Selects subparameters or digit position/decrements digit for numeric changes
- PRINT – Increments digit for numeric entries
- ON/OFF – Turns the indicator either on or off
- TARE RECALL – Provides backstep in configuration mode
- 0 – 9 – Used to enter numeric values directly
- ENT

3.3.1 Option 1 – Expanded Resolution

Enabling Option 1 increases the indicator resolution by allowing display graduation selections beyond the normal 20,000 in Parameter 1 of the configuration mode.

Up to 80,000 displayed graduations are available when this option is on; however, applying such high gains to the data may cause undesirable display instability in some applications.

The expanded resolution (OP.1) is shown in Table 3-8.

Prompt Display	Interpretation
Expanded Resolution	
OP.1 oF	Off
OP.1 on	On (expanded up to 80,000 displayed graduations)

Table 3-8. Expanded Resolution Options

3.3.2 Option 2 – Analog Output

Option 2 converts serial data into 0–10 Vdc or 4–20 mA analog output. The analog output tracks gross, net, or displayed weight and includes automatic checking and verification.

The Option 2 configuration is shown in Table 3-9. Detailed information about the Option 2 analog output configuration is contained in RLWS manual P/N 63223.

Option	Prompt Display	Interpretation	Notes
All off	-----	Mode not enabled (Options 1 through 10 turned off)	—
OP.2	OP.2 o F OP.2 o n	Off Analog option disabled On Analog option enabled	—
	2.1 dSP Gr net	Analog tracks display Analog tracks gross weight Analog tracks net weight	—
	2.2 P.1 P.2	Indicator data out on Port 1 (to analog) This port is not used	Use standard indicator setup for serial configuration under menu 14 (configuration Switch S-2 closed) to establish communications before using the Option 2 menu. Port 1 from the indicator to the analog module must be set for the desired baud rate and be in continuous output mode. In the Option 2 menu, set the indicator port to 1. On analog board S1, set baud rate switches (1 and 2) to match Menu 14.
	2.3 OFF dE Co	Analog module does not pass serial data Analog module outputs serial on demand Analog module outputs serial continuously	
	2.4 12 24 48 96	Pass-through serial output baud rate 1200 baud 2400 baud 4800 baud 9600 baud	—
	2.5 Zr	Enter weight value for analog zero using the numeric keys. The TARE key stores new value; the display responds with ENTER.	The display for Parameters 2.5 through 2.8 alternate between the parameter selection and the actual data value currently entered. This alternation will continue until the data for the parameter has been increased or decreased. NOTE: After entering new data, use TARE key to store. The display will again resume switching between parameter and data.
	2.6 FS	Use the same procedure as 2.5 to enter analog full scale value.	
	2.7 Zr.A	ZERO TRIM: While measuring the analog output, use the lb/kg CONV and PRINT keys to increment/decrement the zero value. Increment/decrement function forces a test mode zero output. The TARE key stores the new value.	
	2.8 SP.A	SPAN TRIM: Same as 2.7 except a span test mode output is provided.	

Table 3-9. Option 2 Analog Output

3.3.3 Option 3 – Time and Date

The time and date clock is attached to the battery-backed memory (U4) and will continue running when the indicator is off. A variety of formats for printout are available, and access is provided for adjustments (see Table 3-10).

NOTE: *Option 3 must be enabled when using the Option 4 auto shutoff feature.*

Prompt Display	Interpretation	Notes
Time and date option		Time and date settings can be directly accessed in normal running mode by holding down both the 0 and 3 keys for a few seconds. The operator can then make changes without using Option switches. To exit, press the 0 key.
OP.3 oFF	Off (time and date disabled)	
OP.3 On	On (time and date enabled)	
3.1 12 24	Selects 12- or 24-hour time display	
3.2 A P	AM (A) or PM (P) setting when 12-hour clock is selected	
3.3 Un Ab on	Selects the location of printed time and date data: under (Un), above (Ab), or on the same line (On) as weight data.	
3.4 LEt nO	Prints date in letters (LEt) or numbers (nO). For example: Sept 1, 1999 vs. 09/01/1999	
3.5 tl	Time. Use numeric keys to enter the time in hours, minutes and seconds (HHMMSS), then press the ENTER key (see Note below)	The display for parameters 3.5 and 3.6 alternates between the parameter and the current data value. This continues until new data is entered using the numeric keys. After entering new data, press ENTER again to alternate the display.
3.6 dA	Date. Use numeric keys to enter the date in month, day and year format (MMDDYY), then press the ENTER key (see Note below)	

Table 3-10. Option 3 Configuration Selections

NOTES:

- The display for parameters 3.5 and 3.6 alternates between the parameter selection and the current data value. This continues until new data is entered via the numeric keys. After keying in new numeric data, press the ENTER key to save the new value. The display will again alternate.
- Time and date can be directly accessed in normal running mode by pressing both the 0 and 3 keys for a few seconds. This allows the time or date to be changed without using the Option switches. To exit, press the 0 key.

3.3.4 Option 4 – Auto Shutoff Mode

The auto shutoff mode can prolong battery life for applications using the battery input power to the indicator.

Option 4 allows the indicator to be configured to shut off automatically when idle for a specified time (1–9 minutes). Parameter 4.2 can be enabled to reset the shutoff timer if motion is detected on the scale after the timer is started.

Option 4 is not a “sleep mode”; once the indicator shuts off, it must be turned on again. With Option 4 enabled, the on/off switch becomes active (see Figure 3-6) and can be used to restart the unit.

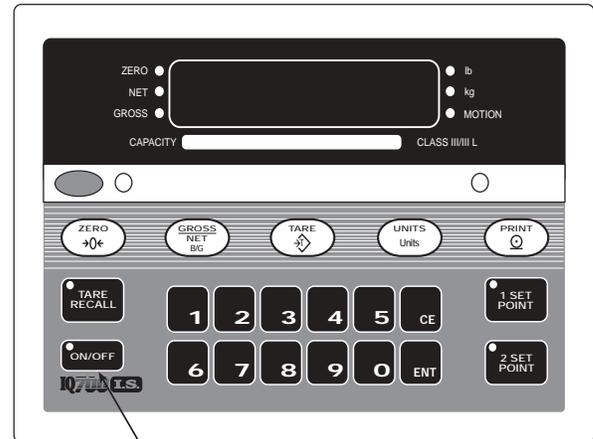
NOTES:

- Option 4 requires hardware setup inside the indicator enclosure and must be enabled at the factory.
- Option 3 (time and date) must be enabled and set to use Option 4.

Prompts for auto shutoff mode (OP.4) are shown in Table 3-11.

Prompt Display	Interpretation
Auto Shutoff Mode	
OP.4 oFF	Off: Auto shutoff mode disabled
OP.4 on	On: Auto shutoff mode enabled
Shutoff timer value	
4.1 <i>n</i>	Set number of minutes, 1–9, before shutoff
Motion detection	
4.2 on	On: Shutoff timer is reset if motion is detected before timer expires
4.2 oFF	Off: Indicator always shuts down when shutoff timer expires

Table 3-11. Option 4 Configuration Selections



ON/OFF Switch

Figure 3-6. On/Off Switch for Option 4

3.3.5 Option 6 – Five-Point Linear Calibration

Enabling Option 6 places the indicator in a linearization calibration when the unit is in the calibration mode (SW1-1 closed on front panel DIP switch). Use the five-point linearization procedure outlined in Section 4.3 on page 25 to perform a scale calibration when Option 6 is enabled.

The five-point linearization calibration (OP.6) is shown in Table 3-12.

Prompt Display	Interpretation	Notes
Five-point linearization		
OP.6 oFF	Off	—
OP.6 on	On	Enter up to five linearization points

Table 3-12. Option 6 Configuration Selections

3.3.6 Option 7 – Smart Serial I/O

The smart serial I/O option offers flexibility for an operator to customize the serial output format for individual system requirements. The selections under Option 7 can be divided into three groups.

- Customizing of serial output data.
- Setup of MACRO files.
- Those files that affect serial operation.

These sections are addressed in detail below.

Customizing Files

The smart serial I/O option offers flexibility for an operator to customize the serial output format for individual system requirements. The selection of the associated custom print file is performed automatically by serial port and the data mode (gross, net, total recall, or special) that the IQ 700IS is currently in at the time of a print.

The custom print supports:

- Specifying starting and terminating characters like -STX, CR, LF
- Adding printer control characters
- Custom headers and titles
- Customizing units to ounce, tons, or pounds
- Customized parameters such as “gross weight” instead of “GR”.
- Custom insertion of special parameters such as time/date and identification number
- Delays where and when required
- Custom “P” print out in duplex mode

NOTE: *Custom print does not support RS-485 protocol.*

3.4 Setting Up Custom Transmits (Smart I/O)

The following sections serve to give a more detailed explanation of Option 7.

3.4.1 Enabling Option 7

To enable Option 7:

1. Put the indicator into digital option configuration mode by closing front panel DIP switches 2 and 3. If all of the options are turned off, the display shows dashes (-----).
2. Press and hold the ENTER key on the keypad until the word *OPTIon* appears on the display.
3. Release the ENTER key and the display changes to *OP . 1 o F*, indicating that you are at Option 1 and that it is currently turned off (*o F* indicates the option is off, *o n* indicates that the option is on). At this point, the ZERO key steps forward through the options and the

TARE RECALL key steps backward through the options. For instance, if you press the ZERO key once, the display shows *OP . 2 o F*, indicating that Option 2 is currently turned off.

4. Press the ZERO key again and the display shows *OP . 3 o F*.
5. Press the TARE RECALL key to step back to option 2.
6. Press the ZERO key until the display reads *OP . 7 o F*.
7. Press the NET/GROSS key to turn on Option 7.

Custom Transmit Files

The indicator has two custom transmit files for Port 1 (there is a third file - file 7.4 - for Port 1, but it is reserved for future use). Each of the custom transmit files may contain up to 30 character codes. If you need a custom transmit to print more than 30 character codes, you need to use the custom transmit macros which are explained in a later section. The codes may be any of the ASCII codes (see Table 6.2 on page 37) or parameter control codes (see Table 3-18 on page 23).

The following sections call out what each file is used for.

File 7.1: Gross Weight Data on Port 1

File 7.1 is used to customize the format of the gross weight. This changes the way the printout appears when the indicator is in the normal mode and the gross weight is on the display.

File 7.2: Net Weight Data on Port 1

File 7.2 is used to customize the net data (for example, gross, tare and net weights).

NOTE: *You must have a tare weight (press the TARE key) in order for File 7.2 to be printed. Without a tare weight, the indicator defaults to printing File 7.1 or the standard printout if File 7.1 does not contain a custom transmit or an invalid custom transmit.*

File 7.4: Special on Port 1

File 7.4 is currently reserved for future use by Condec.

Macro Files

There may be times when you need to print more than the 30 character codes that are allowed in the custom transmit files (7.1 - 7.4). To do custom transmits larger than 30 character codes, the indicator provides eight macro files (7.9 - 7.16) that may be called in from the custom transmit files. This is done by putting a parameter code of 600, 601, 602, 603, 604, 605, 606 or 607 in your custom transmit files. Each macro file can contain up to 30 character codes. You can, however, call more than one macro in your custom transmit or even call the same macro more than once. Any codes that you can enter into the custom transmits can also be entered into the macro files. A string of up to 250 characters may be printed by using a custom transmit and any combination of macro files.

Planning Custom Transmits and Macros

Starting with a very simple example, suppose that you want to print the TIME and DATE on the weight tickets using the indicator's custom transmit feature (you must enable and configure the TIME and DATE option: Option 3). The example uses normal weigh mode.

Although it is not absolutely necessary to write out the codes first, you may find this advisable the first few times until you understand doing custom transmits. These pages could also be put into the job files for later reference (in case the indicator has to be replaced for example).

Make sure to denote the specific file you are working on and add some sort of file description. The indicator formats the output according to the File 7.1 when the gross weight is on the display. It is used to print the gross weight only. You should not attempt to print the tare or net weights in File 7.1 (you must use File 7.2 for gross/tare/net printouts). If you attempt to print the net or tare weights from File 7.1, the indicator will consider that to be an invalid file and print the gross weight data using its default format.

The Parameter Code Command Chart (see Table 3-18 on page 23) lists special codes that are not actually sent to the printer, but instead tell the indicator to send one of its internal parameters such as weight data and TIME and DATE. All of the parameter control codes are numbers above 127. The indicator uses an eight data bit word, meaning that it can only send ASCII characters 1-127 (0 is a NULL and ignored by the indicator). The parameter control codes tell the indicator to print one of the indicator's parameters or to call one of the macro files.

At this point, it is recommended that you get your indicator, printer (hook up per instructions), and manual and follow along, or read first and then go through programming with the indicator.

NOTE: *Parameters 200-223 are used in the normal mode.*

Enter the digital option configuration mode (see Section 3.3 on page 14), then use the ZERO key to advance to Option 7. The display shows *OP7 of*. Press the GROSS/NET key to turn Option 7 ON. Press the TARE key to advance to File 7.1. Turn on File 7.1 by pressing the LB/KG CONV key. To access the first line of the file press 1SET POINT key. The display shows *01 XXX*. The left two digits show the line number of your file. The right three digits display the ASCII equivalent of the character you enter. Refer to the ASCII Control Code Chart (see Table 6.2 on page 37) or the Parameter Control Code Chart (see Table 3-18 on page 23) for the ASCII code you wish to enter.

To initiate the print:

1. Enter a Start of Text (STX) character in line 1. Press 2, then press ENT.

NOTE: *An alternative way to enter the STX {002} character is to press 2 then advance to the next entry by pressing 1SET POINT, but you will not see the code you just entered. The display momentarily shows ENTER, then shows 01 002.*

2. Since we want to print TIME and DATE with our weight data, press keys 4, 0, 0, and then ENT (this tells the indicator to print the TIME and DATE as you have it set up in Option 3). Display shows *02 400*.
3. Press 1 SET POINT to advance to line 3. TIME and DATE are on one line, so end it with a Carriage Return/Line Feed (CR/LF).
4. Press 1,3 then ENT. The display shows *03 013*.

NOTE: *Leading zeroes are not required.*

5. Press 1SET POINT to advance to line 4. The display shows *04 000*.
6. Press 1, 0 and ENT. The display shows *04 010*.
7. Press 1 SET POINT for line 5. According to the Parameter Control Code Chart 200 will print the weight as we have it set up in parameter 14.
8. Press 2, 0, 0 and ENT. The display shows *05 200*. Advance to the next line, enter the code for carriage return. The next line is line feed.

- Press 9, 9, 9 and ENT to end this file. To review the file, press the 2 SET POINT key. With each press of this key we step back one line. Check against Table 3-13.

Line Number	Code	Code Definition
01	002	STX (start of text)
02	400	Time and date
03	013	Carriage return (CR)
04	010	Line Feed (LF)
05	200	Gross Wt. "LB/KG GR"
06	013	Carriage Return (CR)
07	010	Line Feed (LF)
08	999	End of file

Table 3-13. Print File 7.1 (7.1, T/D, Gross Wt.)

In the GROSS mode, press PRINT to produce a ticket in this format:

```
6:42 PM 04/16/02
8594 LB GR
```

Figure 3-7. Sample Print from File 7.1

NOTE: If the control code 400 is used in a custom print, you must enable and set Option 3.

Notice that the sample print format does not exceed 30 lines of code. Now add a company name or logo to the ticket. We can do this by setting up a MACRO. This MACRO can be called into any format that is set up by using the correct Parameter Control Code. According to the Parameter Control Code Chart, if this information is to be used in a print format, enter a code 600 - call Macro 1.

Use the following example:

GLEN CO inc. (line 1)

GLENWOOD MN. (line 2)

Time/Date (line 3)

Format 1: GROSS weight (line 4)

Format 2: GROSS (ln 4), TARE (ln 5), NET (ln 6)

Line Number	Code	Code Definition
01	002	STX (start of text)
02	600	call MACRO 1 (File 7.9)
03	400	Print Time and Date
04	013	Carriage return
05	010	Line feed
06	200	Gross wt. "LB/KG GR"
07	013	Carriage return
08	010	Line feed
09	999	END OF FILE

Table 3-14. Print File 7.1 Example (7.1, Co. Logo, T/D, Gross Wt.)

```
GLEN CO inc.
GLENWOOD MN.
10:22 PM 04/16/02
10000 LB GR
```

Figure 3-8. Sample Print from File 7.1

Line Number	Code	Code Definition
01	002	STX (start of text)
02	600	call MACRO 1 (File 7.9)
03	400	Print Time and Date
04	013	Carriage return
05	010	Line feed
06	220	Gross wt. "LB/KG GR"
07	013	Carriage return
08	010	Line feed
09	220	Tare wt. "LB/KG TR"
10	013	Carriage return
11	010	Line feed
12	210	Net wt. "LB/KG NT"
13	013	Carriage return
14	010	Line feed
15	999	END OF FILE

Table 3-15. Print File 7.2 Example (7.2, Co. Logo, T/D, GR, TR, NT)

```

GLEN CO inc.
GLENWOOD MN.
10:22 PM 04/16/02
10000 LB GR
5000 LB TR
5000 LB NT

```

Figure 3-9. Sample Print from File 7.2

Line Number	Code	Code Definition
01	071	G alphabetic character
02	076	L alphabetic character
03	069	E alphabetic character
04	078	N alphabetic character
05	032	SP (space)
06	067	C alphabetic character
07	079	O alphabetic character
08	032	SP (space)
09	105	i alphabetic character
10	110	n alphabetic character
11	099	c alphabetic character
12	046	. (period)
13	013	Carriage return (CR)
14	010	Line feed (LF)
15	071	G alphabetic character
16	076	L alphabetic character
17	069	E alphabetic character
18	078	N alphabetic character
19	087	W alphabetic character
20	079	O alphabetic character
21	079	O alphabetic character
22	068	D alphabetic character
23	032	SP (space)
24	077	M alphabetic character
25	078	N alphabetic character
26	046	. (period)
27	013	Carriage return (CR)
28	010	Line feed (LF)
29	999	End of MACRO, return to main file

Table 3-16. File 7.9 Macro 1

NOTES:

- When necessary, the start of text (STX) character tells the printer that data is being transferred for printing.
- A macro does not repeat the start of text character. Only the main file has the STX character.
- Macros can be called as many times as needed in a print file.
- The code 999 serves as END OF FILE as well as RETURN TO MAIN PRINT FILE command.
- Files and MACROS have a maximum of 30 lines each.
- If the indicator is in the GROSS mode, it will print File 7.1. If the indicator has a tare value entered and is in the net mode, it will print File 7.2.
- It is a good idea to write out the custom print format you want on a worksheet, then enter it into the indicator. Keep this in your records for that indicator - if something happens to the unit, you will not have to recreate the custom print format.

Depending on the type of printer that you are using, you could also send special code sequences to the printer itself, as long as the ASCII codes are 127 or lower. For example, with the Epson TM-295 printer, it is possible to include the code sequence to release the paper (ASCII characters 27, then 113) after the ticket is printed. Different printers have different commands that are available using special codes like this. For more information about printer codes, refer to the documentation that was supplied with the printer.

There is one code that has not been covered yet but may come in handy if working with an older printer, such as a Hecon tape printer. Code 700 is the parameter control code that the IS indicator interprets as DELAY PER SETUP. Some older printers may have limited buffering capability or memory enough for just a few lines of text. Therefore, it is very easy to overrun the printer and you can lose an entire line of text or get several lines garbled together. To prevent this, insert a code 700 between the carriage return and the line feed. This causes the indicator to pause for the amount of time specified in parameter 14.2. A delay of 1 or 2 seconds should be adequate for most of these printers.

Entering the Custom Transmits and Macros

After some examples of planning custom transmits and macros, next enter the first two example files and see what results.

Follow the diagram in Figure 2-1 on page 4 to connect the printer through the I/O barrier to port 1 of the IS indicator.

NOTE: *If the printer can not provide an active current loop to retrieve the information from the barrier, you must install an interface unit that can and will output the format used by your printer.*

Enable Option 7 if it is not already enabled (see Section 3.4.1 on page 18). You can then select the desired custom transmit file (we will enter files 7.1 and 7.2 from the first example) using the TARE and TARE RECALL keys. The TARE key takes you forward and the TARE RECALL key goes backwards. With *OP.7ON* displayed, press the TARE key once to bring up file 7.1 (you will see *7.1OFF* displayed). If you go too far, use the TARE RECALL key to go backwards. Now turn on custom transmit by pressing the lb/kg CONV key if it is not already enabled.

In the same way that the TARE and TARE RECALL keys step through the custom transmit files, the 1 SETPOINT and 2 SETPOINT keys step forward and backward through the individual characters in the file (the lines on your worksheet). Press the 1 SETPOINT key to display the first character of File 7.1. If the custom transmit has never been configured before, the memory used to store the codes may be in a random state. This could produce codes that do not seem to make any sense. Enter File 7.1 per Table 3-13 on page 20. Exit setup mode.

If the indicator is not displaying the gross mode, press the NET/GROSS key to display the gross weight. Attach a weight simulator to the indicator, then dial the weight up to 500 pounds and press the PRINT key. You get a ticket with the following format:



```
10:22 PM 04/16/02
500 LB GR
```

Figure 3-10. Print Example

Enter File 7.2 per Table 3-15 on page 20 and File 7.9 per Table 3-16 on page 21. Tare the indicator then dial the weight up to 800 pounds and press the PRINT key.



```
GLEN CO inc.
GLENWOOD MN.
10:22 PM 04/16/02
1300 LB GR
500 LB TR
800 LB NT
```

Figure 3-11. Print Example

The first time the PRINT key was pressed, a ticket was printed using custom transmit file 7.1. With a tare weight in the indicator and the net weight on the display, the ticket was printed using custom transmit File 7.2. Although this may seem rather obvious, we have received a few phone calls from technicians who insisted that the custom transmit was not working properly when they simply had not done a tare or were not in the net mode.

Summary

The following are some general points summarizing what is covered in this document.

- Custom transmits are configured using option 7 of the indicator.
- Close DIP switches 2 and 3 to enter option configuration mode.
- If the display shows “-----” with dip switches 2 and 3 closed, press and hold ENT for the option menu.
- ZERO steps forward through the options.
- NET/GROSS toggles the option on or off.
- TARE steps forward through the option’s subparameters (7.1, 7.2, 7.3, etc.).
- TARE RECALL steps backward through the options and subparameters.
- Lb/kg CONV toggles subparameters on and off.
- 1 SETPOINT steps forward through the codes in a custom transmit or macro.
- 2 SETPOINT steps backward through the codes in a custom transmit or macro.
- Files 7.1 and 7.2 print the gross data and net data in normal mode on port 1.
- Custom transmit files may contain up to 30 codes.
- Macros (7.9 - 7.16) may be called by your custom transmit files to print custom transmits up to 250 characters long.
- You may use any of the ASCII codes (see Table 6.2 on page 37) and parameter control codes (see Table 3-18 on page 23).

- You may use any of the control codes listed in your printer's programming guide as long as those codes are between 1 and 127 inclusive.
- Parameters 600-607 call macros 1-8, respectively, from your custom transmit files.
- Parameter 700 causes the IQ 700IS to pause for the delay period specified in parameter 14.2.
- Parameters 400-402 print the time and/or date according to Option 3 setup.
- To enter a code into a file, enter the code number and press the ENT key to enter it or 1 SETPOINT to enter the code and move on to the next code.
- To insert a code, press the ENT key to move all of the codes from the current code on one place to the right, making an open space (a null code 0) that you may replace by typing the new code and pressing either the ENT or 1 SETPOINT key.
- To delete a code from the table, select the code using the 1 SETPOINT and 2 SETPOINT keys, then press the CE key.

Port Number	File Number	Normal Mode
1	7.1	Gross Weight Data
1	7.2	Gross/Tare/Net Weight Data
1	7.4	Special

Table 3-17. UMC600IS Custom Transmit Files

Code Number	Description	Code Number	Description
200	Gross Wt. "LB/KG GR"	400	Time & Date per setup
201	Gross Wt. "LG/KG"	401	Time per setup
202	Gross Wt.	402	Date per setup
203	Gross Wt. (no 0 blanking)	600	Macro file 1 (File 7.9)
210	Net Wt. "LB/KG NT"	601	Macro file 2 (File 7.10)
211	Net Wt. "LN/KN"	602	Macro file 3 (File 7.11)
212	Net Wt.	603	Macro file 4 (File 7.12)
213	Net Wt. (no 0 blanking)	604	Macro file 5 (File 7.13)
220	Tare Wt. "LB/KG TR"	605	Macro file 6 (File 7.14)
221	Tare Wt. "LT/KT"	606	Macro file 7 (File 7.15)
222	Tare Wt.	607	Macro file 8 (File 7.16)
223	Tare Wt. (no 0 blanking)	700	Delay per setup (parameter 14.2)
300	Status character (m=motion, etc.)	999	End of file

Table 3-18. Parameter Code Command Chart

4.0 Calibration

The IQ 700IS indicator can be calibrated using single slope span calibration or five-point linearization. Zero must be calibrated (see Section 4.1) before either span or linearization calibration can be performed.

NOTE: Unit requires 6 wire load cell cable or jumpers (see Figure 2-7 on page 7). If anything other than 6 wire is used, deadload will not adjust.

4.1 Zero Calibration

Zero calibration is accomplished by the following steps:

1. Clear the scale (no load).
2. Close SW1-3 (dead load). The leftmost display digit should be flashing *C* as shown in Figure 4-1.

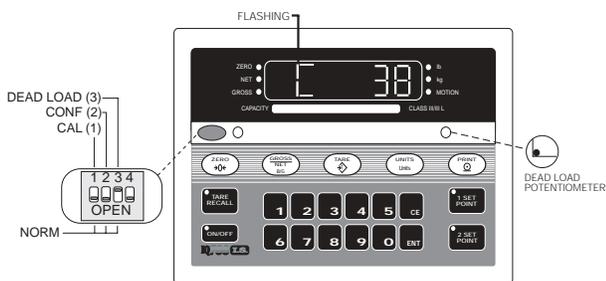


Figure 4-1. Close Switch 3

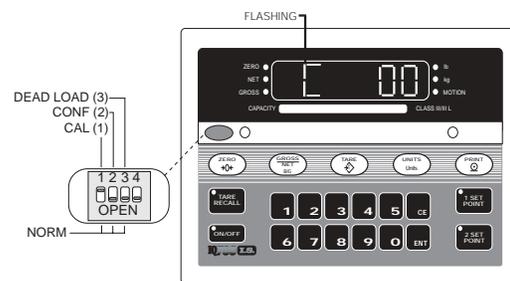


Figure 4-2. Close Switch 3 and Open Switch 1

3. Adjust dead load potentiometer to obtain a reading at or near zero (see Figure 4-2).
4. Open SW1-3 and close SW1-1 to put the indicator in the digital calibration mode. The display may change from a zero reading, which is acceptable.
5. Press the ZERO key. The display should read ---CAL, then return to a zero reading.

4.2 Single Slope Span Calibration

1. Place a test weight on the scale and wait for the motion LED to go out.
2. Enter weight value using keyboard. When correct, press ENT. The display will read ---CAL briefly, then return to the correct reading.
3. Recheck by clearing scale.
4. Open all switches to place the unit in normal weighing mode (Figure 4-3).

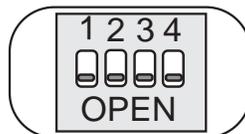


Figure 4-3. SW1 with All Switches Open

5. Reinstall flexible overlay over display and push to the top.
6. Close center bar and tighten center bar screws. Seal the unit if used in a legal-for-trade application.

4.3 Five-Point Linear Calibration

There are five calibration points (La, Lb, Lc, Ld, and Le) that can be entered sequentially. Calibrations using fewer than five points will linearize the curve up to the last data point. The curve is then extrapolated from the last entry point. For best results, use values of 20%, 40%, 60%, 80%, and 100% of full scale for the five linearization points.

1. Turn on Option 6 (see Section 3.3.5 on page 17).
2. After performing a zero calibration as described in Section 4.1, place the first test weight on the scale platform. Allow 10 or more seconds for stabilization (motion LED goes out).

NOTE: *Straight averaging is applied during calibration.*

3. Enter test weight value for the first calibration point using the numeric keyboard.
4. When the display is correct, press the ENT key. The display will read *CAL* briefly. The value of the last calibration point entered will then appear with a flashing display prompt *L_* indicating the next calibration point to be entered (Lb, Lc, Ld, or Le).
5. Recheck Steps 2, 3 and 4 for Lb, Lc, Ld, and Le with the appropriate test weights.
6. Recheck the zero weight by emptying the scale.

NOTE: *AZM is off during calibration. Dead load display provides signal reference.*

7. When complete, open all switches on SW1.
8. Re-install faceplate bracket and tighten the knurled fasteners. Seal the unit if used in a legal-for-trade application.

Calculations Example

Capacity = 200,000 lb x 20 lb

Number of graduations = $200,000 \div 20 = 10,000$

Configuration:

- Parameter 1 = 100 (10,000 graduations)
- Parameter 2 = 20 (resolution)
- Parameter 3 = 0 (no decimal point)

Other Factors to Note

AZM/PAZ: $1.9\% \times 200,000 = 3800$ lb

Overrange: $103\% \times 200,000 = 206,000$ lb

Minimum calibrated load: $10\% \times 200,000 = 20,000$ lb

Analog Sensitivity

Analog signal input range: 0.7 to 3.2 mV/V

Analog signal sensitivity: $0.3 \mu\text{V}/\text{graduations}$ at 20,000

For H-44 requirements, use a factor of 4 ($1.2 \mu\text{V}/\text{grad}$). If the lower signal range is used for calibration, the indicator may fail acceptance testing with $0.3 \mu\text{V}/\text{grad}$.

NOTE: *Check for a minimum live load of 12 mV for 10,000 graduations. If less than 12 mV, increase the number of graduations accordingly.*

5.0 Normal Weighing Mode Operations

This section provides the operator with a description of front panel key functions and associated annunciators (LEDs) used to operate the IQ 700IS in the normal weighing mode.

After the unit has been configured and calibrated, the unit is then placed in the weighing or normal weighing mode (SW 1-1 through SW 1-4 open). In this mode, the weight indicator displays live weight data that is presently on the scale.

5.1 Display Test

The display check and EPROM verification are used to test the indicator LED.

5.1.1 Display Check

Observe the display when power is first applied to the indicator. All six indicator LEDs (Zero, Net, Gross, lb, kg, and Motion) should be turned on and each seven segment display, with its associated decimal point, will advance across the display field, allowing the operator to check for any missing segments or decimal points.

5.1.2 EPROM Verification

Upon completion of the display check an EP. 49.x momentarily appears on the display. This value indicates to the operator the current EPROM that has been installed in the IQ 700IS. The IQ 700IS operates with an EPROM family group KDA 49.x (x is the version).

5.2 LED Annunciators

Table 5-1 shows the display panel annunciator and the definitions of the annunciator.

Annunciator	Annunciator Definition
ZERO	On when gross weight data is within $\pm 1/4$ graduation of the center of zero
NET	On when indicator is in net weighing mode
GROSS	On when indicator is in gross weighing mode
lb/kg	Shows units of displayed weight data
MOTION	On when display data is changing by the number of graduations selected in Parameter 9 in configuration mode

Table 5-1. Annunciator Definitions

5.3 Function Keys

Table 5-2 describes the various functions of the IQ 700IS keys.

Key	Functional Description
ZERO	Rezeroes scale if the gross weight is within the band of zero selected in the configuration mode (1.9% or full scale)
GROSS NET	Selects the desired weight data to be viewed (GROSS or NET). The gross and net LED annunciators indicate which display mode is active.
TARE	When used in the gross mode, the indicator will acquire the tare value and automatically shift to the net display mode. If a tare acquisition is negative or the weight data is in motion, the indicator remains in the present mode and no tare is performed.
UNIT	If the indicator is set up to perform lb/kg conversion, this key toggles weight data between its calibrated base weight unit in lb to kg units. The lb and kg annunciator LEDs indicate which units are displayed.
PRINT	Issues a demand print command to the serial output.

Table 5-2. Function Key Description

5.4 Gross/Tare/Net Weighing Operations

In normal mode, the IQ 700IS displays gross, tare, or net weights using the LED annunciators to indicate scale status and the type of weight value displayed.

5.4.1 Display Mode on Power Up

When the IQ 700IS is initially powered up, the display automatically appears in the gross mode.

5.4.2 ZERO Key Function

If the gross weight zero is within the zero band, press the zero key. The following conditions make invalid zero conditions:

- Gross weight data above the defined zero band
- Gross weight data in motion
- Overload/underload condition

5.4.3 TARE Key Function

If the tare acquisition is greater than zero (+1/2 graduation), set the display to the net mode and apply the new tare.

If the tare acquisition is negative or in motion, the indicator stays in the current mode and no tare is performed.

5.4.4 Overload and Underrange Conditions

Overload conditions occur when the weight exceeds the selected scale capacity by greater than 105%, or overload may indicate a defective load cell or load cell simulator input.

NOTES:

- If the indicator is configured for legal-for-trade (PTZ = 2%), overload occurs at 103% of full scale capacity if push-to-zero has already captured 2% of full scale (105% minus 2% = 103%).

Underload conditions will occur when scale input is greater than -400 grads, or underload may indicate a defective load cell or load cell simulator input. Figure 5-1 shows the indicator display associated with over and underrange conditions.

See Section 6.1 on page 30 for information about additional error messages.

- If 6-wire load cell wiring or sense jumpers are not installed, unit may show OL, UL, or a varying value.



Overload



Underrange

Figure 5-1. Overload and Underrange Error Displays

5.4.5 Lb/Kg Conversion

When Parameter 10 in the configuration mode is set to Con (conversion), pressing the unit key toggles the weight display units from lb (calibrated base units) to kg units (converted units from base weight data) and vice versa.

5.5 Fixed Tare Entry

Do the following to enter a fixed tare entry through the front panel:

1. From normal weighing mode, press GROSS/NET to place unit in net mode.
2. Using the front panel numeric keys, key in the desired tare weight. If the displayed tare value is correct, press the Enter (ENT) key. Press the Clear Entry (CE) key to clear an incorrect value.

Both auto and fixed tare values can be recalled by pressing the TARE RECALL key. The flashing LED on the TARE RECALL key indicates that the unit is displaying the current tare value.

5.6 Serial Output

There are two ways in which the user can issue the print command:

- Pressing the local PRINT key or issuing a serial print command (unit must be set up for bidirectional serial communication).

 **Warning** *An intrinsic safety barrier must be installed in the system before using serial I/O functions.*

5.6.1 Serial Data Formats

Serial data is transmitted in ASCII-compatible format and consists of the following:

- One start bit
- Seven data bits
- One parity bit (odd)
- One stop bit

Table 5-3 lists characters used in the IQ 700IS serial data string.

Character	Description
<STX>	Non-recording "start of text" character
<POL>	Polarity sign; space for positive data, minus (-) for negative data
<DATA>	Seven-digit numeric data field including decimal point or fixed (dummy) zero when selected. Leading zero suppression with leading zeroes transmitted as space characters.
<ID DATA>	Six-digit numeric data field with no decimal point and no leading zeroes.
<ID>	Two character label field for identification (ID)
<NO>	Three ASCII character label field for Identification Number (NO)
<SP>	Space character
<LB/KG>	Two-character data field identification for weighing units in demand mode: Weight in lb = <LB> Weight in kg = <KG>
<L/K>	One-character data field identification for weighing in continuous mode: Weight in lb = <L> Weight in kg = <K>
<GR/NT>	Two-character data field identification for weighing mode in demand mode: Gross mode = <GR> Net mode = <NT>
<G/N>	One-character data field identification for continuous output mode: Gross mode = <G> Net mode = <N>
<P>	Print command
<CR>	Carriage return (message terminator)
<CR/LF>	Two-character data field: carriage return followed by line feed; used in both transmission modes to indicate end of message
<STAT>	One-character data field identification in continuous mode, used to indicate the status of the indicator display. Characters are listed in order of priority: higher priority status characters override lower priority status characters.
NOTE: Bracket delimiters (< and >) are shown for clarity only; delimiters are not sent in the serial data stream.	

Table 5-3. Serial Data Character Descriptions

Status Character Definitions

The status character (<STAT>) provides information to the receiving device about the current indicator operation. Table 5-4 shows the status characters returned by the IQ 700IS indicator.

Status Characters	Description
<D> (44H)	Digital calibration mode
<A> (41H)	Analog calibration mode
<I> (49H)	Invalid data
<O> (4FH)	Over or under range
<M> (4DH)	Scale in motion
<X> (58H)	Not supported
<Y> (59H)	Not supported
<Z> (5AH)	Tare recall data displayed
<SP> (20H)	Normal display (valid data)
* Setpoint support is not enabled for this indicator.	

Table 5-4. Status Data Character Descriptions

NOTES:

- Response data (xxxxxx) is six characters with no decimal point, seven with decimal point. Leading zeroes are shown as space characters.
- Invalid data requests or entries are responded to with an echo of valid portion and the letter I indicating the invalid portion.

5.6.2 Demand Mode versus Continuous Data Output

Demand mode is used to interface with printers and requires a manual Print command from the front panel to initiate the output data. To comply with legal-for-trade regulations, demand output data is inhibited during the following conditions:

- Scale in motion
- Positive overload
- Negative overload
- Negative gross weight displayed
- Unit in display check mode
- Other display modes

NOTE: *In legal-for-trade applications, the Motion Detection Parameter (Parameter 9) must be turned ON.*

In demand mode, the operator may choose to print Gross/Tare/Net when in net mode. If the serial port is set to Print on Demand mode, the format is:

```
<STX><POL><DATA><SP><LB/KG><SP><GR/NT>
<SP><CR><LF>
```

Demand Print with Identification Number

In normal mode, the demand print output data can be labeled with a six-digit ID number. To print label data, the operator must enter six digits (maximum) using the numeric keys (no leading zeroes), then press the PRINT key. The format to set demand print with ID number is:

```
<STX><SP><SP><6DIGITS><SP><ID><SP><NO><CR>
<LF><STX><POL><DATA><SP><LB/KG><SP>
<GR/NT><SP><CR><LF>
```

General Continuous Mode Output Data Format

Continuous mode is used to interface to computers, scoreboards, and other remote devices requiring constant data updating. Continuous mode transmission occurs at the end of each display update.

```
<STX><POL><DATA><L/K><G/N><STAT><CR><LF>
```

Downloading/Recall of Fixed Tare

The format to fixed tare data entry (see Table 5-5) is:

```
<FE>(XXXXXX)<CR>
```

The format with unit echo (see Table 5-5) is:

```
<FR>(XXXXXX)<CR>
```

Character	Identification Definition
<, >	Bracket delimiters are not sent
SE	Setpoint entry (53H, 45H)
SR	Setpoint recall (53H, 52H)
FE	Fixed tare entry (46H, 45H)
FR	Fixed tare recall (46H, 45H)
n	Setpoint parameter 0-6
(	Data opening parenthesis (28H)
)	Data closing parenthesis (29H)
CR	Command terminator (0DH)
xxxxxx	DATA characters must be six or less including decimal point if configured: 999999 or 999.99. Space and polarity characters can not be used in fixed tare data entry.

Table 5-5. Data String Characters

6.0 Appendix

6.1 Error Messages

The IQ 700IS indicator provides a number of error and status messages. When an error occurs, the message is shown on the indicator LCD display. Table 6-1 lists these messages and their meanings.

Error Message	Description	Solution
<i>Err1</i>	Loss of configuration	Reconfigure
<i>Err1a</i>	Loss of option configuration	
<i>Err1b</i>		
<i>Err1c</i>		
<i>Err2</i>	Loss of zero calibration	Recalibrate
<i>Err3</i>	Loss of span calibration	
<i>Err5</i>	Loss of auto tare	Acquire tare
<i>Err6</i>	Loss of auto zero	Acquire zero
<i>Err9</i>	Not in span calibration	Program span value before entering
<i>Err 10H</i>	Input > 3.3 mV/V at full scale	Recalibrate span to set full scale in the range 0.4–3.3 mV/V
<i>Err 10L</i>	Input < 0.4 mV/V at full scale	
<i>Err 10P</i>	PTZ (push to zero) > 2%	Perform zero calibration
<i>Err 10–</i>	PTZ > weight used for span calibration	
<i>OL</i>	Gross overload	Check load cell wiring
<i>UL</i>	Gross underrange	
<i>CAL</i>	Calibration successful	—

Table 6-1. IQ 700IS Error Messages

6.2 ASCII Character Chart

Control	ASCII	Dec	Hex	ASCII	Dec	Hex	ASCII	Dec	Hex	ASCII	Dec	Hex
Ctrl-@	NUL	00	00	space	32	20	@	64	40	`	96	60
Ctrl-A	SOH	01	01	!	33	21	A	65	41	a	97	61
Ctrl-B	STX	02	02	“	34	22	B	66	42	b	98	62
Ctrl-C	ETX	03	03	#	35	23	C	67	43	c	99	63
Ctrl-D	EOT	04	04	\$	36	24	D	68	44	d	100	64
Ctrl-E	ENQ	05	05	%	37	25	E	69	45	e	101	65
Ctrl-F	ACK	06	06	&	38	26	F	70	46	f	102	66
Ctrl-G	BEL	07	07	'	39	27	G	71	47	g	103	67
Ctrl-H	BS	08	08	(	40	28	H	72	48	h	104	68
Ctrl-I	HT	09	09	)	41	29	I	73	49	i	105	69
Ctrl-J	LF	10	0A	*	42	2A	J	74	4A	j	106	6A
Ctrl-K	VT	11	0B	+	43	2B	K	75	4B	k	107	6B
Ctrl-L	FF	12	0C	,	44	2C	L	76	4C	l	108	6C
Ctrl-M	CR	13	0D	-	45	2D	M	77	4D	m	109	6D
Ctrl-N	SO	14	0E	.	46	2E	N	78	4E	n	110	6E
Ctrl-O	SI	15	0F	/	47	2F	O	79	4F	o	111	6F
Ctrl-P	DLE	16	10	0	48	30	P	80	50	p	112	70
Ctrl-Q	DC1	17	11	1	49	31	Q	81	51	q	113	71
Ctrl-R	DC2	18	12	2	50	32	R	82	52	r	114	72
Ctrl-S	DC3	19	13	3	51	33	S	83	53	s	115	73
Ctrl-T	DC4	20	14	4	52	34	T	84	54	t	116	74
Ctrl-U	NAK	21	15	5	53	35	U	85	55	u	117	75
Ctrl-V	SYN	22	16	6	54	36	V	86	56	v	118	76
Ctrl-W	ETB	23	17	7	55	37	W	87	57	w	119	77
Ctrl-X	CAN	24	18	8	56	38	X	88	58	x	120	78
Ctrl-Y	EM	25	19	9	57	39	Y	89	59	y	121	79
Ctrl-Z	SUB	26	1A	:	58	3A	Z	90	5A	z	122	7A
Ctrl-[	ESC	27	1B	;	59	3B	[	91	5B	{	123	7B
Ctrl-\	FS	28	1C	<	60	3C	\	92	5C	|	124	7C
Ctrl-]	GS	29	1D	=	61	3D	]	93	5D	}	125	7D
Ctrl-^	RS	30	1E	>	62	3E	^	94	5E	~	126	7E
Ctrl- <u>_</u>	US	31	1F	?	63	3F	_	95	5F	DEL	127	7F

Table 6-2. ASCII Character Chart

6.3 Specifications

Power

Power Input Intrinsicly safe power supply (7.5 VDC output) or optional 6 VDC battery

Analog Specifications

Full Scale Input Signal	Up to 45 mV
Load Cell Excitation	5 VDC, fixed
Load Cell Current	60 mA (4 x 350 Ω load cells)
Load Cell Cabling	6-wire configuration with remote sensing
Analog Signal Input Range	0.7 mV/V to 3.2 mV/V
Analog Signal Sensitivity	0.3 μ V/graduation
Resolution	10 000 dd (NTEP), 80 000 expanded
Measurement Rate	10 measurements/sec
Display Increments	1, 2, 5, 10, 20, 50, 100
Decimal Point	0, 0.0, 0.00, 0.000, 0.0000
AZM (Zero Tracking)	Gross mode only: configurable to ± 0.5 grads, ± 1.0 grads, ± 3.0 grads, or off
PAZ and ATM Aperture	Configurable to $\pm 1.9\%$ or 100% of full scale
Motion Band	Configurable to ± 1 or ± 3 grads; 1-second delay or no delay
Calibration Method	Software, with optional five-point linearization

Serial Communications

Port 1 Full duplex 20 mA at 9600, 4800, 2400, 1200, 600, or 300 bps

Operator Interface

Display	6-digit LED display. 7-segment, .6 in (15 mm) digits
Annunciators	Center of zero, Gross, Net, Motion, lb/kg
Keyboard	21-key flat membrane panel with 0–9 numeric keys, ENT (Enter), CE (Clear Entry), ZERO, GROSS/NET, TARE, TARE RECALL, PRINT, lb/kg CONV, SP1, SP2, ON/OFF

Environmental

Operating Temperature -10 to $+40$ °C (14 °F to 104 °F)

Enclosure

Enclosure Dimensions	9.0 in x 6.44 in x 4.0 in 23 cm x 16 cm x 10 cm See Figure 6-1 on page 33
Rating/Material	NEMA 4X, stainless steel

Certifications and Approvals



NTEP

CoC Number 89-023A299-010
Accuracy Class III/III L
 n_{max} : 10 000



FM #0ZOAZ.AX

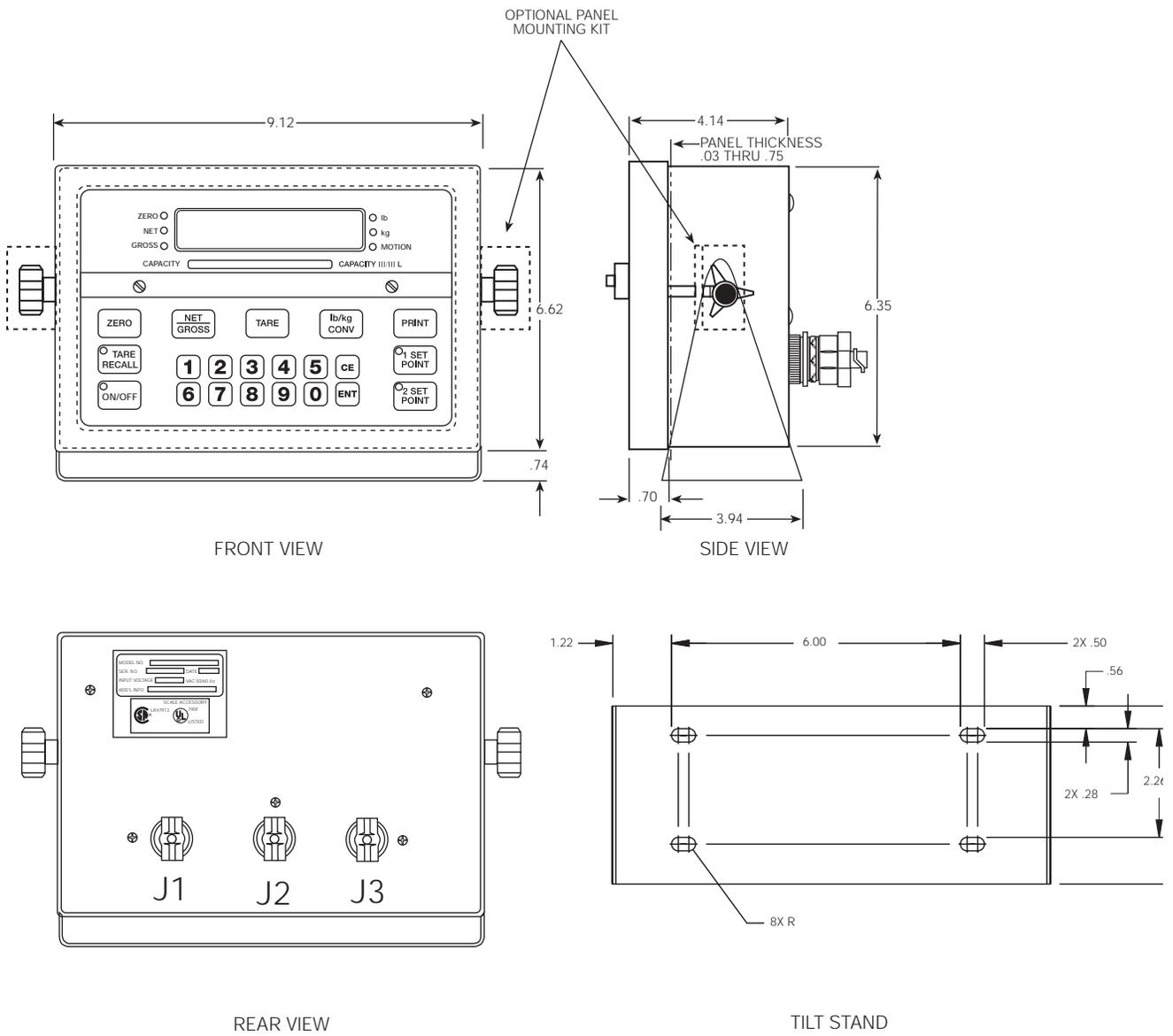


Figure 6-1. Standard Unit Dimensions

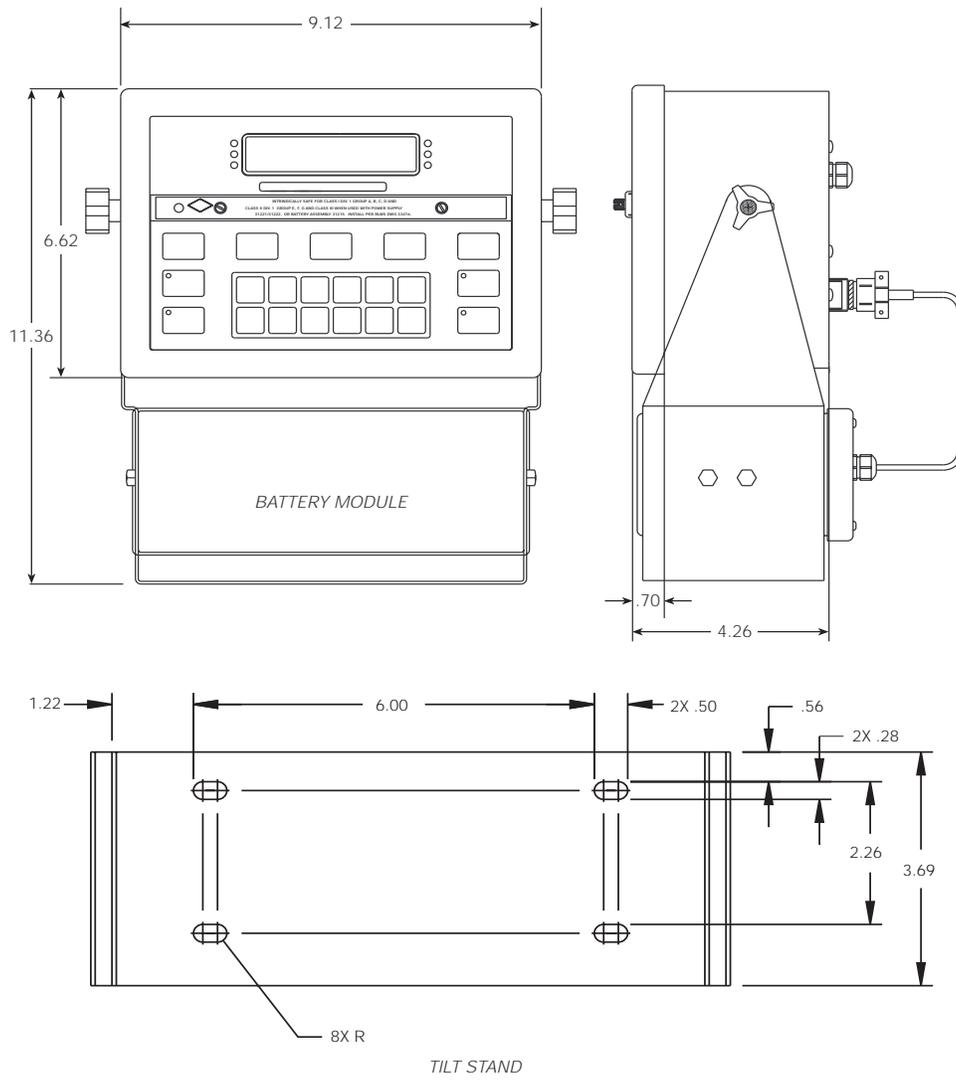


Figure 6-2. Battery-Powered Unit Dimensions

IQ 700IS Limited Warranty

Rice Lake Weighing Systems (RLWS) warrants that all RLWS equipment and systems properly installed by a Distributor or Original Equipment Manufacturer (OEM) will operate per written specifications as confirmed by the Distributor/OEM and accepted by RLWS. All systems and components are warranted against defects in materials and workmanship for two years.

RLWS warrants that the equipment sold hereunder will conform to the current written specifications authorized by RLWS. RLWS warrants the equipment against faulty workmanship and defective materials. If any equipment fails to conform to these warranties, RLWS will, at its option, repair or replace such goods returned within the warranty period subject to the following conditions:

- Upon discovery by Buyer of such nonconformity, RLWS will be given prompt written notice with a detailed explanation of the alleged deficiencies.
- Individual electronic components returned to RLWS for warranty purposes must be packaged to prevent electrostatic discharge (ESD) damage in shipment. Packaging requirements are listed in a publication, *Protecting Your Components From Static Damage in Shipment*, available from RLWS Equipment Return Department.
- Examination of such equipment by RLWS confirms that the nonconformity actually exists, and was not caused by accident, misuse, neglect, alteration, improper installation, improper repair or improper testing; RLWS shall be the sole judge of all alleged non-conformities.
- Such equipment has not been modified, altered, or changed by any person other than RLWS or its duly authorized repair agents.
- RLWS will have a reasonable time to repair or replace the defective equipment. Buyer is responsible for shipping charges both ways.
- In no event will RLWS be responsible for travel time or on-location repairs, including assembly or disassembly of equipment, nor will RLWS be liable for the cost of any repairs made by others.

THESE WARRANTIES EXCLUDE ALL OTHER WARRANTIES, EXPRESSED OR IMPLIED, INCLUDING WITHOUT LIMITATION WARRANTIES OF MERCHANTABILITY OR FITNESS FOR A PARTICULAR PURPOSE. NEITHER RLWS NOR DISTRIBUTOR WILL, IN ANY EVENT, BE LIABLE FOR INCIDENTAL OR CONSEQUENTIAL DAMAGES.

RLWS AND BUYER AGREE THAT RLWS'S SOLE AND EXCLUSIVE LIABILITY HEREUNDER IS LIMITED TO REPAIR OR REPLACEMENT OF SUCH GOODS. IN ACCEPTING THIS WARRANTY, THE BUYER WAIVES ANY AND ALL OTHER CLAIMS TO WARRANTY.

SHOULD THE SELLER BE OTHER THAN RLWS, THE BUYER AGREES TO LOOK ONLY TO THE SELLER FOR WARRANTY CLAIMS.

NO TERMS, CONDITIONS, UNDERSTANDING, OR AGREEMENTS PURPORTING TO MODIFY THE TERMS OF THIS WARRANTY SHALL HAVE ANY LEGAL EFFECT UNLESS MADE IN WRITING AND SIGNED BY A CORPORATE OFFICER OF RLWS AND THE BUYER.

© 2002 Rice Lake Weighing Systems, Inc. Rice Lake, WI USA. All Rights Reserved.

RICE LAKE WEIGHING SYSTEMS • 230 WEST COLEMAN STREET • RICE LAKE, WISCONSIN 54868 • USA