Shared Data Reference

IND256x

Weighing Terminal

METTLER TOLEDO

IND256x Weighing Terminal

METTLER TOLEDO Service

Essential Services for Dependable Performance of Your IND256x Weighing Terminal

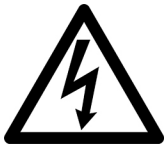
Congratulations on choosing the quality and precision of METTLER TOLEDO. Proper use of your new equipment according to this Manual and regular calibration and maintenance by our factory-trained service team ensures dependable and accurate operation, protecting your investment. Contact us about a service agreement tailored to your needs and budget. Further information is available at www.mt.com/service.

There are several important ways to ensure you maximize the performance of your investment:

1. **Register your product**: We invite you to register your product at www.mt.com/productregistration so we can contact you about enhancements, updates and important notifications concerning your product.
2. **Contact METTLER TOLEDO for service**: The value of a measurement is proportional to its accuracy – an out of specification scale can diminish quality, reduce profits and increase liability. Timely service from METTLER TOLEDO will ensure accuracy and optimize uptime and equipment life.
    a. **Installation, Configuration, Integration and Training**: Our service representatives are factory-trained, weighing equipment experts. We make certain that your weighing equipment is ready for production in a cost effective and timely fashion and that personnel are trained for success.
    b. **Initial Calibration Documentation**: The installation environment and application requirements are unique for every industrial scale so performance must be tested and certified. Our calibration services and certificates document accuracy to ensure production quality and provide a quality system record of performance.
    c. **Periodic Calibration Maintenance**: A Calibration Service Agreement provides on-going confidence in your weighing process and documentation of compliance with requirements. We offer a variety of service plans that are scheduled to meet your needs and designed to fit your budget.
    d. **GWP® Verification**: A risk-based approach for managing weighing equipment allows for control and improvement of the entire measuring process, which ensures reproducible product quality and minimizes process costs. GWP (Good Weighing Practice), the science-based standard for efficient life-cycle management of weighing equipment, gives clear answers about how to specify, calibrate and ensure accuracy of weighing equipment, independent of make or brand.

Warnings and Cautions

- READ this manual BEFORE operating or servicing this equipment and FOLLOW these instructions carefully.
- SAVE this manual for future reference.

	**⚠ WARNING**
	PERMIT ONLY QUALIFIED PERSONNEL TO SERVICE THIS EQUIPMENT. EXERCISE CARE WHEN MAKING CHECKS, TESTS, AND ADJUSTMENTS THAT MUST BE MADE WITH POWER ON. FAILING TO OBSERVE THESE PRECAUTIONS CAN RESULT IN BODILY HARM.
	**⚠ WARNING**
	THE MAINS CONNECTION OF THE POWER SUPPLY UNIT MUST BE MADE BY A PROFESSIONAL ELECTRICIAN AUTHORIZED BY THE OWNER AND IN ACCORDANCE WITH THE RESPECTIVE TERMINAL DIAGRAM, THE ACCOMPANYING INSTALLATION INSTRUCTIONS AS WELL AS THE COUNTRY-SPECIFIC REGULATIONS.
	**⚠ WARNING**
	IF THE IND256x KEYBOARD, DISPLAY LENS OR ENCLOSURE IS DAMAGED, THE DEFECTIVE COMPONENT MUST BE REPAIRED IMMEDIATELY. REMOVE POWER IMMEDIATELY AND DO NOT REAPPLY POWER UNTIL THE DISPLAY LENS, KEYBOARD OR ENCLOSURE HAS BEEN REPAIRED OR REPLACED BY QUALIFIED SERVICE PERSONNEL. FAILURE TO DO SO COULD RESULT IN BODILY HARM AND/OR PROPERTY DAMAGE.
	**⚠ WARNING**
	TO PREVENT IGNITION OF HAZARDOUS GAS, BE SURE TO CUT OFF THE POWER BEFORE OPENING IND256X ENCLOSURE. AFTER IND256X IS POWERED ON, KEEP THE ENCLOSURE STRICTLY SEALED. DO NOT OPEN THE CASE IN THE PRESENCE OF EXPLOSIVE DUST OR GAS.
	**⚠ WARNING**
	DO NOT INSTALL OR PERFORM ANY SERVICE ON THIS EQUIPMENT BEFORE THE AREA HAS BEEN SECURED AS NON-HAZARDOUS BY PERSONNEL AUTHORIZED TO DO SO BY THE RESPONSIBLE PERSON AT THE CUSTOMER'S SITE.
	**⚠ WARNING**
	ONLY THE COMPONENTS SPECIFIED IN THIS MANUAL CAN BE USED IN THIS TERMINAL. ALL EQUIPMENT MUST BE INSTALLED IN ACCORDANCE WITH THE INSTALLATION INSTRUCTIONS DETAILED IN THIS MANUAL. INCORRECT OR SUBSTITUTE COMPONENTS AND/OR DEVIATION FROM THESE INSTRUCTIONS CAN IMPAIR THE INTRINSIC SAFETY OF THE TERMINAL AND COULD RESULT IN BODILY INJURY AND/OR PROPERTY DAMAGE.
	***NOTICE***
	OBSERVE PRECAUTIONS FOR HANDLING ELECTROSTATIC SENSITIVE DEVICES.

Disposal of Electrical and Electronic Equipment

In conformance with the European Directive 2002/96/EC on Waste Electrical and Electronic Equipment (WEEE) this device may not be disposed of in domestic waste. This also applies to countries outside the EU, per their specific requirements.

Please dispose of this product in accordance with local regulations at the collecting point specified for electrical and electronic equipment.

If you have any questions, please contact the responsible authority or the distributor from which you purchased this device.

Should this device be passed on to other parties (for private or professional use), the content of this regulation must also be related.

Thank you for your contribution to environmental protection.

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1 Shared Data Server

All setup parameters and a few triggers and statuses in the terminal are available through a connection called "Shared Data Sever". This is a serial interface assignment on COM1that permits remote clients to send and receive commands and data from the terminal.

1.1. Connection

In order to access the variables in the IND256x terminal, the COM1 port must be used and it must be assigned as Shared Data Sever in the connection menu of setup.

Make sure the serial port of the remote device matches the parameters selected for the COM1 port. This includes the 57600 baud rate, 8 data bits, no parity bit, and 1 stop bit.

Connect an RS-232 cable between the remote client PC and the COM1 port of the IND256x terminal.

Open a program to communicate with the terminal (such as HyperTerminal, sscom3.2). Refer to the Commands section to understand how the commands should be structured.

2 Commands

After connecting to the Shared Data Sever in the IND256x, several commands are available for use by the client. All commands can be given in either upper- or lower-case letters. The quotation marks shown are for clarity only and should not be transmitted. The valid commands are described in the following sections.

- **Response Format:** "read", "write", and "callback" message responses have a formatted header. The first two characters indicate the status. "00" is the success status. "99" is a failure status. The next character is the type of message, "R", "W", or "C". The next three characters are a sequence number, which cycles from 001 to 999, and then starts over again.

2.1. "User" Command

A client must login to the SDSV using the "user" command before accessing Shared Data. The server validates the username and sends a response message back to the user. The SDSV responds with [Access OK] if no password is required or [Enter password] if a password is required.

A client can use only the "user", "pass", "help" and "quit" commands before successfully logging on.

Format: user username

Response 1: 12 Access OK

Response 2: 51 Enter Password

2.2. "Pass" Command

The user enters a password using the "pass" command. If the password is valid, the server displays the [Access OK] message. If not valid, the server displays the [No access] message.

Format: pass password

Response 1: 12 Access OK

Response 2: 93 NO Access

2.3. "Help" Command

The "help" command returns the list of the valid commands for the IND256x.

Format: help

Response: 02 USER PASS QUIT READ R WRITE W FGET FPUT SYSTEM RGROUP XGROUP HELP NOOP

2.4. "Quit" Command

The "quit" command terminates the TCP/IP connection.

Format: quit

Response: 52 Closing connection

2.5. "Read" Command

The "read" command allows the client to read a list of one or more Shared Data fields. An individual field or an entire block can be read. If more than one field is requested, the fields should be separated by a space. If successful, the server responds with a separated list of values in ASCII format. The server separates individually requested fields with a "~"; and Shared Data separates items within a block with a "^". If an error is detected, the server responds with an error message. The maximum length of the reply message is 1,024 characters.

Format: read SDV#1 SDV#2

Example 1: read wt0101 wt0103

Response 1: 00R001~ 11.32~kg~

- The 001 that follows the R in this response example is an incremental counter that indicates the count of the interaction between the client and the Shared Data server. This number continues to increment regardless of the type of event (read, write, group, etc.)

Example 2: read wt0100 (reads entire block)

Response 2: 00R002~ 11.32^ 11.27^kg^^^^^
*********^^11.320000^11.270000^0.000000^0.000000^0.000000^1^44^11.324767^1
1.270586^1^-1088431.000000^1^0.000000^0.000000^^^^~

- The "read" command can be abbreviated to the letter "r" if desired.

2.6. "Write" Command

The "write" command allows the client to write a list of one or more Shared Data fields. A single field or an entire block can be written. The maximum length of the write message is 1,024 characters. Items within a list of writes must be separated with a "~". You must separate items within a block with a "^".

Format: write SDVblock#1 = value1^value2^ value3

write SDV#1 = value1~SDV#2 = value2~SDV#3 = value3

Example1: write wc0100 = 1^0^1^0^1^0 (writes fields into a block)

Response 2: 00W006~OK

Example 2: write wc0101 = 1~wc0102 = 0 (writes fields within a list)

Response 2: 00W007~OK

- The ''write'' command can be abbreviated to the letter ''w'' if desired.

2.7. "System" Command

The "system" command returns a description of the IND256x terminal. This is the same information that is shown on the Recall System Information screen of the IND256x.

Format: system

Response:

00S005~IND256x SYSTEM INFO RECALL
Model: IND256x
S/N: B735597402
ID1: IND256x
ID2: METTLER TOLEDO
ID3:
Software
Boot: 1.00.0000
Standard: 2.00.0037
Hardware
Analog L/C

2.8. "Noop" Command

The "noop" command performs no task; it checks communication and returns an [OK] response message.

Format: noop

Response: 00OK

3 Shared Data Classes

3.1. Dynamic Shared Data

Dynamic Shared Data is stored in dynamic RAM memory. The IND256x re-initializes it to zero at power-up. The Resident Scale Task and Applications dynamically initialize and change the data during execution.

3.1.1. Dynamic Scale Weight (WT)

Access: "Read Only" access level is not customizable.

Class Code: wt

Instances: 1 Instance 1 = Scale platforms 1

Attributes

wt0100	Composite wt block	Struct	na	Composite of entire block
wt0101	Displayed Gross Weight	S13	rt	
wt0102	Displayed Net Weight	S13	rt	
wt0103	Weight Units	S4	rt	lb pounds, kg kilograms, grams, metric tons, ton, oz ounces
wt0108	Displayed Rate	S13	rt	
wt0110	Rounded Gross Weight	D	rt	
wt0111	Rounded Net Weight	D	rt	
wt0112	Auxiliary Gross Weight	D	rt	
wt0113	Auxiliary Net Weight	D	rt	
wt0114	Rate of Change of Weight	D	rt	
wt0115	Scale Processing State	By	rt	0 = disabled 1 = normal weight processing 5 = error.
wt0116	Continuous Output Status A	By	rt	Standard Mettler-Toledo Continuous
wt0117	Fine Gross Weight	D	rt	
wt0118	Fine Net Weight	D	rt	
wt0119	Weight Range	By	rt	0, 1, 2, or 3
wt0120	Filtered Weight Counts	D	rt	

Method

The Resident Scale Task updates the Dynamic Weight Shared Data at every weight update, whenever the weight changes. Typically, this occurs up to 50 times per second, but can vary

depending on the load cell type and the application-type setting in cs0121. The RST converts the weight from the raw filtered counts to the Legal-For-Trade weight.

3.1.2. Scale Commands (WC)

Access: "Operator" default level is customizable by individual field.
Class Code: wc
Instances: 1

Attributes

wc0100	Composite wc block	Struct	na	Composite of entire block
wc0101	Pushbutton Tare Scale	Bl	rc	Appl. sets from 0 to 1 to trigger command
wc0102	Clear Scale	Bl	rc	
wc0103	Print Scale	Bl	rc	
wc0104	Zero Scale	Bl	rc	
wc0105	Switch to Primary Units	Bl	rc	
wc0106	Switch to Secondary Units	Bl	rc	
wc0107	Toggle Primary/Secondary units	Bl	rc	
wc0112	Restart Filtering	Bl	rc	
wc0117	Toggle High-precision weight	Bl	rc	Toggle high precision weight display & calculation setting to on/off. In legal-for-trade mode, high-precision weight display automatically switches back to normal display mode after 5 seconds
wc0124	Print total report	Bl	rc	

Methods

For example, to issue a Tare Command to Scale A, the application sets Shared Data field wc0101 = 1.

After receiving the callback, the Resident Scale Task sets wx0101 = 1 to indicate the command is in progress. When the command is complete, the Resident Scale Task sets wx0101 = 0 to indicate the command is successful or wx0101 = 2 to 255 for a specific error code. It sets wc0101 = 0 so the application can trigger the command again later. The application can register a callback on wx0101 to monitor when the command is complete and to get the completion status of the command.

3.1.3. Scale Statuses (WX)

Access: "Read Only " access level is not customizable.
Class Code: wx
Instances: 1

Attributes

wx0100	Composite wx block	Struct	na	Composite of entire block

wx0101	Tare Scale Status	By	rt	Command Completion Statuses: 0 = Success 1 = Command In Progress 2-255 = Specific error code.
wx0102	Clear Tare Status	By	rt	
wx0103	Print Scale Status	By	rt	
wx104	Zero Scale Status	By	rt	
wx0105	Switch to Primary Units Status	By	rt	
wx0106	Switch to Secondary Units Status	By	rt	
wx0107	Toggle primary/secondary status/ 3rd unit	By	rt	
wx0112	Restart Filtering Status	By	rt	
wx0115	Write to EEPROM Status	By	rt	
wx0117	Toggle High-precision wt status	By	rt	
wx0118	Switch to Display of Aux Units	By	rt	
wx0131	Motion	Bl	rt	Scale Processing Statuses
wx0132	Center of Zero	Bl	rt	0 = no, 1 = yes
wx0133	Over Capacity	Bl	rt	
wx0134	Under Zero	Bl	rt	
wx0135	Net Mode	Bl	rt	
wx0138	Weight Data OK	Bl	rt	
wx0141	Stored Weight Mode	Bl	rt	
wx0145	X10 weight display	Bl	rt	1 = X10 mode 0 = normal mode.
wx0146	MinWeigh LOW indication	Bl	rt	1 = Net weight below MinWeight threshold.
Wx0150	Zero Weighing Request	By	rt	0 = No Zero weighing command request 1 = Zero Weighing command request

Methods

The Resident Scale Task sets the first set of statuses to reflect the status of commands to the scale. The second set of statuses to show the dynamic run-time status of the scale weight.

3.1.4. Setup Sequencing Control (QC)

Access: "Service" default level is customizable by individual field.

Class Code: qc

Instances: 1, referring to the Selected Scale

Attributes

qc0100	Composite qc block	Struct	na	Composite of entire block
qc0148	Enter Setup Mode Command	Bl	rc	Command to CP and RST.
qc0149	Exit Setup Mode Command	Bl	rc	
qc0160	Reset Data Connections	Bl	rc	1 = Reset data connections setup

qc0161	Restart IND256x	Bl	rc	1 = Do a soft restart of the IND256x
qc0168	Reconfigure PLC Thread	By	rc	1 = start, 0 = done
qc0182	The test of "Approval" and SW1-1	By	rc	Run the test of "Approval" and SW1-1
qc0189	Remote Tare/Target Command	By	rt	This field enables a PC or PLC to set remotely a new active Tare or Target in the IND256x from the IND256x Standard Database Tables.

The Tare or Target ID must first be set in qc0190 before issuing the command in qc0189.

Command values:

The PC/PLC sets commands in this field, as follows:

1 ; Set an active Tare for Scales , respectively, from the Tare Table using ID in qc0190

6 ; Set an active Target for Scales , respectively, from Target Table using ID is in

11 ; Set an Target weigh in for Scales , respectively, from Target Table using ID is in

16 ; Set an Target weigh out for Scales , respectively, from Target Table using ID is in qc0190.

Status values: The IND256x sets the status of the command back in this same field, as follows:

Command in progress = 255

No matching database record found = 254

Successful completion = 0

Database record values:

Upon successful completion, the IND256x has also written the new active Tare Table or Target Table record to the appropriate fields of the TD block, where the PC/PLC can read them.

qc0190	Tare or Target Table ID	S20	rt	Tare or Target Table ID for command in qc0189. You must first set this ID before issuing the command in qc0189.

3.1.5. Simple Setpoint Commands (SK)

Access: "Supervisor" default level is customizable by individual field.

Class Code: sk

Instances: 7

Attributes

sk0100	Composite sk block	Struct	na	Composite of entire block
sk0101	Restart Target	Bl	rc	Appl. sets from 0 to 1 to trigger command
sk0102	Abort Target	Bl	rc	
sk0103	Apply New Target Coincidence	Bl	rc	
sk0104	Reset Latch	Bl	rc	
sk0106	Pause Target	Bl	rc	Puts Target in a pause state, turns off feed status, and turns on pause status
sk0107	Resume Target	Bl	rc	Resumes Target from pause state, turns off pause status, and turns on feed status if applicable

3.1.6. Simple Setpoint Statuses (SS)

Access: "Read Only" access level is not customizable.

Class Code: ss

Instances: 7

Attributes

ss0100	Composite ss block	Struct	na	Composite of entire block
ss0101	Command Completion Status	By	rt	Command Completion Status. 0 = Success 1-255 = Specific error code.
ss0102	Latched	Bl	rt	0 = no, 1 = yes
ss0103	Feeding	Bl	rt	0 = no, 1 = In Progress
ss0104	Timing	Bl	rt	0 = no, 1 = In Progress
ss0105	Pause	Bl	rt	1 = Pause state
ss0106	In Progress	Bl	rt	1 = In Progress state.
ss0107	Cycle Complete	Bl	rt	1 = Cycle Complete State
ss0199	Composite Feed Status	US	rt	Bitwise status ss0102 to ss0107

Method

Please read the method description in the simple Target Process for the Simple Target Process Data Block," sd. Here, the application can set commands and read the status of the Simple Target operation.

3.1.7. Full Setpoint Commands (SC)

Access: "Supervisor" default level is customizable by individual field.

Class Code: sc

Instances: 1

Attributes

sc0100	Composite sc block	Struct	na	Composite of entire block
sc0101	Restart/Resume Setpoint	Bl	rc	Set from 0 to 1 to trigger command, this command updates the active copy of the setpoint form SP Share Data and resets the setpoint latch,and enable setpoint Case 1: Over/Under mode or no latching material transfer mode: Set from 0 to 1 to trigger command. This command updates the active copy of the setpoint from SP SDV, and enable setpoint and restart setpoint Case 2: latching material transfer mode: Set from 0 to 1 to trigger command. If setpoint is not running ,this command updates the active copy of the setpoint from SP SDV, reset setpoint latch, enable setpoint and restart setpoint if setpoint is paused, Resume setpoint
sc0102	Abort Setpoint	Bl	rc	Set form 0 to 1 trigger this command this command operates only when the target

				is paused. It turns off all ST statuses associated with setpoint, sets the latch and disable setpoint
sc0103	Apply New Target Coincidence	Bl	rc	This command only updates the active setpoint target value weight from Shared Data. It does not change any other active setpoint fields.
sc0106	Pause Setpoint	Bl	rc	Set from 0 to 1 trigger command, Operates only if target is running, puts setpoint in pause state, turns off feed status, and turns on pause status
sc0107	Resume Setpoint	Bl	rc	Set from 0 to 1 to trigger command. This command works only from the pause state. It does not update the copy of the target from SP shared data, it only resets the latch and enables the target

3.1.8. Full Setpoint Statuses (ST)

Access: "Read Only" access level is not customizable.
Class Code: st
Instances: 1
Attributes:

st0100	Composite st block	Struct	na	Composite of entire block
st0102	Latched	Bl	rt	0 = no, 1 = yes
st0103	Feeding	Bl	rt	0 = no, 1 = In Progress
st0104	Fast Feeding	Bl	rt	0 = no, 1 = In Progress
st0105	Below Low Tolerance Weight	Bl	rt	0 = Over Low Tolerance Weight, 1 = Under Low Tolerance Weight
st0106	Above High Tolerance Weight	Bl	rt	0 = Under High Tolerance Weight, 1 = Over High Tolerance Weight,
st0107	In Tolerance	Bl	rt	0 = Out of Tolerance, 1 = In Tolerance
st0111	Pause	Bl	rt	1 = Pause state
st0112	Complete	Bl	rt	1 = Complete

Method

Please read the method description in the Setpoint Process for the Full Setpoint Process Data Block," sp". Here, the application can read the status of the Full Setpoint operation.

3.1.9. Custom Print Commands & Statuses (CP)

Access: "All Users" default level is customizable by individual field.
Class Code: cp
Instances: 1
Attributes:

cp0100	Composite cp block	Struct	na	Composite of entire block
cp0101	Custom Print 1–3	Bl	rc	Application sets from 0 to 1 = command to

cp0103	start custom print			
cp0111 to cp0113	Custom Print 1–3 status	By	rt	Command Completion Statuses 0 = Success, 1-255 = Specific error code.

Method

The Application uses this Shared Data block to trigger custom prints and to monitor their completion status.

3.1.10. Barcode Input Message (MB)

Access: "All Users" default level is customizable by individual field.

Class Code: mb

Instances: 1

Attributes:

mb0100	Composite mb block	Struct	na	Composite of entire block
mb0101	barcode message	S51	na	Resident Serial Services decomposes the message into message blocks according to the Input Message Template
mb0102	Clear message block	Bl	rc	The application must set this command when it is done processing the current message.
mb0103	New message received	Bl	rt	Trigger to application indicating that a new input message is ready for the application to begin processing.

Method

Resident Serial Services parses a Barcode Input string based on the message definition in the Barcode Template BT Setup fields and stores the parsed message in the Shared Data Message Block. The Data Connections DC Setup fields assign the BT input message to a Serial port.

The Serial Services buffers serial port input data. The Serial Services copies the next message from its buffer into the mb0101 Shared Data field, and sets the mb0103 trigger to alert the application that a new message is ready. When the application has completed processing the current message block, it must set the mb0102 trigger to the clear the message block. Then, the Serial Services can again copy the next message from its buffer to the message block.

3.1.11. Network Node Status (NS)

Access: "Read Only" access level is not customizable.

Class Code: ns

Instances: 1

Attributes:

ns0100	Composite ns block	Struct	na	Composite of entire block
ns0124	PLC Online	Bl	rt	

Method

The Resident Scale Task maintains the PLC online/offine status. The Application can read theses statuses.

3.1.12. System State (XD)

Access: "Read Only" access level is not customizable.

xd0153 has "Administrator" access level

Class Code: xd

Instances: 1

Attributes:

xd0100	Composite xd block	Struct	na	Composite of entire block
xd0103	Current Date	S12	na	Format defined in xs0110.
xd0104	Time of Day	S12	na	Format defined is xs0111.
xd0107	Second Ticks	UL	rt	Number of seconds since power-up.
xd0112	Clear System message Display	By	rt	clear Current System message Display in xd0153
xd0115	Consolidated Weight String	S44	rt	Consolidated weight stream
xd0131	System Setup State	By	rt	0 = Normal Run State, 1 = Setup State,
xd0139	Baseboard Switch settings	By	na	Settings of the 2 toggle switches on the baseboard. Bit 0 = switch 1, Bit 1 = switch 2, Bit 2 = switch 3 , Bit 3 = switch 4
xd0153	Current System message Display	S21	rt	the message is written to the display again and again as long as there is data in the SDV. If SDV is empty, no message is displayed on the system line. The terminal will not clear this every 3 seconds - the application must do this.
xd0157	Firmware checksum	UL	rt	firmware checksum

Methods

This block shows the current state of the IND256x system.

The IND256x only updates date and time fields when an Application or RST attempts to access these fields. The IND256x updates the clock tick fields regularly so an application may use these fields for periodic callbacks. xs0110 and xs0111 contain the format specification for the date and time.

The **Consolidated Weight Stream (CWS)** is a string that contains the weight

- Within this field, the weight is metrologically consistent among gross, net, and tare weights. We cannot guarantee this when the application does individual reads because they occur at different times.
- It is more efficient to get all the data in one access instead of multiple accesses.
- An application can access the CWS either locally or remotely.

The IND256x sets data in the CWS according to field xp0102, where application subscribes to the fields it wants reported. The format of xp0102 is S<ABCDE>T where ABCDE represents the scales, S represents the selected scale and T is the Time. "S" is mutually exclusive from ABCDE.

The Consolidated Weight Stream has the following format: stream 1><US><stream 2><US><stream n>, and it may contain time, display, and application messages inserted in the output stream, with <US> separating the fields. Each weight stream has the following contents:

<Node ID> 1N Range: 1 to 20，IND256x is fixed at 1

<Scale ID> 1A Range: A to E. If selected scale, range is in lower case <A to E>. It is always A in IND256x.

<Status>1C Bit 7 Always 0

Bit 6 Always 1

Bit 5 1 = Scale in Motion

Bit 4 1 = Center of Zero

Bit 3-2 00 = single range

01 = weight range 1

02 = weight range 2

03 = weight range 3

Bit 1 1 = Net Mode

Bit 0 1 = Preset Tare

<Units> 1N 0 = None, 1 = lb, 2 = kg, 3 = g, 4 = t, 5 = ton, 9 = oz

<Net Wt> 10N 8 digits plus possible "-"and "."

"^^^^^^^^^^" indicates the gross weight on scale is over capacity.

"vvvvvvvvv" indicates the gross weight is under zero.

"0101010101" indicates an indeterminate weight.

<Tare Wt> 10N 8 digits plus possible "-"and "."

3.1.13. Logged-In Users (XL)

Access: "Read Only" access

Class Code: xl

Instances: 1, IND256x only supports one user

Attributes:

xl0100	Composite xl block	Struct	na	Composite of entire block
xl0101	Logged-On User Name	S13	na	Name of user currently logged-on
xl0102	Access Privilege Level of User	By	na	1 = Operator, 2 = Supervisor, 3 = Service, 4 = Administrator

3.1.14. System Feature Triggers & Controls (XC)

Access: "Supervisor" default level is customizable by individual field.

Class Code: xc

Instances: 1

Attributes:

xc0100	Composite xc block	Struct	na	Composite of entire block

Triggers to disable features through a Discrete Input Keyswitch

xc0104	Disable Setup	BI	rt	
xc0106	Disable Keypad	BI	rt	
Triggers to activate/deactivate Ladder Logic				
xc0112	Master Control Relay	BI	rt	Master switch for turning on/off discrete outputs. 1 = discrete outputs enabled. 0 = all discrete outputs disabled.
xc0113	Run Ladder Logic	BI	rc	Run ladder logic
xc0114	Stop Ladder Logic	BI	rc	Stop ladder logic
Triggers to turn on/off display				
xc0115	Disable Display	BI	rt	1 = disable, 0 = enable
Triggers to Initiate Miscellaneous Functions from Discrete Inputs				
xc0130	Enter key trigger	BI	rc	Trigger to simulate the enter key, when set it to be 1, as press a Enter key form Key board
xc0132	Run Calibration test	BI	rc	
xc0134	Run ID	BI	rc	
xc0136	Operate strike Enter Key	BI	rc	Key task set this trigger to 1 when the operation strikes the Enter Key,the application clear it, application can register callback functions to trigger some applications
xc0137	Toggle SmartTrac	BI	rc	SmartTrac softkey or assigned to discrete I/O will trigger this command
xc0139	Reprint Last Demand Print	BI	rc	1 = reprint the last demand or custom print Applications use this trigger for DUPLICATE PRINT request.

Method

These system triggers enable, disable, or activate IND256x functions through Discrete Inputs. You must setup Ladder Logic rungs to tie the Discrete Inputs to these triggers. Applications may also access these features by writing to these Shared Data triggers.

3.1.15. System Commands (XK)

Access: "Operator" default level is customizable by individual field.

Class Code: xk

Instances: 1

Attributes:

xk0100	Composite xk block	Struct	na	Composite of entire block
xk0111	Set Current time	S12	rt	set current time
xk0112	Set Current date	S12	rt	set current date

3.1.16. Application Dynamic Commands and Events (AC)

Access: "All Users" default level is customizable by individual field.

Class Code: ac

Instances: 1

Attributes:

ac0100	Composite ac block	Struct	na	Composite of entire block
ac0101 to ac0120	Commands 1-20	Bl	rc	Commands for destined for the Application.

Methods

Applications may use this block of Shared Data for receiving Dynamic commands. One use is communicating command data with remote tasks over PLC or TCP/IP communications.

3.1.17. Application Dynamic Statuses (AS)

Access: "All Users" default level is customizable by individual field.

Class Code: as

Instances: 1

Attributes:

as0100	Composite as block	Struct	na	Composite of entire block
as0101	Statuses 1-20	By	rt	Statuses for Application to respond to
as0120	Command			

Methods

Applications may use this block of Shared Data for setting Dynamic statuses. One use is communicating status data with remote tasks over PLC or TCP/IP communications.

3.1.18. Application Dynamic Integer Fields (AI)

Access: "All Users" default level is customizable by individual field.

Class Code: ai

Instances: 1

Attributes:

ai0100	Composite ai block	Struct	na	Composite of entire block
ai0101	Integer Fields 1-20	US	rt	Application may use these fields to
ai0120	exchange dynamic data			

Methods

Applications may use this block of Shared Data for storing Dynamic integer fields. One use is exchanging integer data with remote tasks over PLC or TCP/IP communications.

3.1.19. Application Dynamic Floating Point Fields (AJ)

Access: "All Users" default level is customizable by individual field.

Class Code: aj

Instances: 1

Attributes:

aj0100	Composite aj block	Struct	na	Composite of entire block

aj0101 to aj0120	Floating Point Fields 1-20	D	rt	Application may use these fields to exchange dynamic data
aj0121	estimate battery time	D		

Methods

Applications may use this block of Shared Data for storing Dynamic floating point fields. One use is exchanging floating point data with remote tasks over PLC or TCP/IP communications.

3.1.20. Board Identifications (BD)

Access: "Read Only" access level is not customizable.
Class Code: bd
Instances: 3
Attributes:

bd0100	Composite bd block	Struct	na	Composite of entire block
bd0101	Board Installed This Slot	Bl	na	0 = no, 1 = yes
bd0102	Description	S21	na	E.g. "IND256x"
bd0105	Board Type	By	na	0 = None, 13 = Analog Output, 27 = WiFi Board, 28 = Current Loop - Passive, 29 = Current Loop - Active

Method

At power-up, the Resident Scale Task reads the hardware boards and writes their identification to Shared Data.

3.2. Protected Setup Data

BRAM Setup Data is stored in Flash memory that protects the data across power failures. The IND256x Setup program typically sets this Shared Data once during setup and then it never changes again. The Resident Scale Task and Applications may access the data frequently.

3.2.1. Scale Setup (CS)

Access: "Service" default level is customizable by individual field.
Class Code: cs
Instances: 1
Attributes:

cs0100	Composite cs block	Struct	na	Composite of entire block
cs0101	Scale Type	By	na	Analog Scale(A), Remote Scale(E), None(N).
cs0103	Scale ID	S21	na	Text Identifier name for scale
cs0104	Auxiliary Weight Units	By	na	0 = none, 1 = pounds, 2 = kilograms, 3 = grams, 4 = metric tons, 5 = tons, 6 = troy ounces, 7 = penny weights, 8 = ounces, 9 = custom units
cs0105	Enable Permanent High	Wt.Bl	na	Enable high-precision weight display to include an

	Prec.			additional decimal digit beyond the specified division size for permanent display
cs0107	Rate Time Units	S2	na	No, Sec, Min, Hour
cs0108	Rate Weight Units	By	na	0 = None. 1 = primary unit
cs0112	Custom Units Name	S13	na	
cs0113	Custom Units Conversion Factor	D	na	
cs0114	Low-Pass Filter Corner Frequency	D	na	0 to 9.9 Hz. 0 Hz disables filter. The filtering routines select the closest available filtering setting to your selection and write it back into this field.
cs0115	Low-Pass Filter Poles	By	na	2, 4, 8
cs0116	Notch Filter Frequency	D	na	For Analog Scale Bases only, 0 to 99 Hz. The filtering routines select the closest available filtering setting to your selection and write it back into this field.
cs0118	Ultra-Stability Filter Enable	Bl	na	1 = yes.
cs0120	Units Switch Enable	Bl	na	1 = yes
cs0121	Application Process Type	By	na	1 = high update rate for process control apps. 2 = mid speed update rate. 3 = low update rate for transaction apps.
cs0125	Custom Units Increment Size	D	na	Custom Units Increment Size
cs0129	MinWeigh feature	By	na	0 = disabled, 1 = enabled
cs0130	MinWeigh entry mode	By	na	0 = calculated, 1 = direct
cs0132	Timeout	By	na	value 0~99, 0 means don't wait no motion, 1~98 means terminal will wait from 1 ~ 98 seconds for motion before failing. 99 means waiting for no motion.
cs0175	Timed Zero timeout index	By	na	0 – disable timeout, 1 = 10 min, 2 = 15 min, 3 = 30 min, 4 = 45min
cs0176	Wait interval between each timer of Timed Zero	US	na	ms // Add for IND256x target control usage

Filtering

The goal of filtering the weight counts is to remove the internal and external noise from the weight signal. Ideally, users of weight indication would like instant response to a weight input (settling time = 0), and immunity from all signal disturbances. In practice, in selecting a filter, you must trade off settling time and disturbance rejection to find an acceptable compromise.

There are two major classes of weighing applications: transaction and process weighing. In transaction weighing, a load to the scale base is more or less a step input, and the user only wants the actual static weight value of the load. Most shipping, vehicle, food, and service scales fall into this category. Settling time requirements typically range from 0.5 seconds in service scales to several seconds in vehicle or livestock scales. Disturbance rejection requirements vary widely within this weighing classification, but usually there is a need for a very stable final weight reading.

In process weighing, automation equipment or humans continuously add the load over some time. Even though only the final weight reading may be preserved, knowledge of the time varying weight reading is important during the weighing process. Batching, filling, and in-motion weighing fall into this category. Settling time requirements are usually more relaxed because the "final" settling time for a ramp input is less than that of the same load applied as a step input. Disturbance rejection is important since many types of automation equipment introduce vibrations. Stability of the "final" value is somewhat less important.

IND256x filtering has a large range of adjustment for both disturbance rejection and settling time to meet all application requirements. Since these two parameters are dependent, some experimentation is usually required to find the best fit for the application.

The following describes the Analog Load Cell Interface filtering. The IND256x Analog Scale Interface provides a 366 Hz A/D sampling rate, which permits highly effective digital filtering. Since most of the filtering is digital, it is easily adjusted over a wide range of selections via soft switch setup to meet specific site needs. IND256x has three types of configurable digital filters:

1. Low Pass Filter

All weighing applications use the low pass filter. The user can specify the corner frequency of the pass band and the slope of the transition band. The pass band extends from DC (0 Hz) to the corner frequency. The low pass filter accepts the frequencies within this low-pass range with little or no attenuation, but attenuates frequencies above the pass band according to the slope of the transition band.

The scale is measuring the DC signal (static weight), so it is tempting to make the corner frequency very low to reject all "noise". However, the narrower the pass band, the longer the delay or settling time before we get the final value. As the corner frequency is increased, the scale will settle faster, but will also allow more noise through.

The transition slope describes the rate of change of the attenuation once outside the pass band. The steeper the slope, the more effective a filter is at rejecting a disturbance that is near the corner frequency. Making the slope infinite will cut off all frequencies above the corner. Again the price is delay; the steeper the slope, the longer the settling time.

The IND256x provides a multi-pole Infinite Impulse Response (IIR) low pass digital filter, with Service Technician control over both the filter corner frequency and the sharpness of the transition band slope. The corner frequency is defined in Hz; its adjustment range is 0.2 through 10 Hz. The number of filter poles defines the band slope; there can be from 2 to 10 poles, providing cutoff slopes of -40 through -200 dB/decade. This large range of adjustability provides effective filtering for almost any situation.

2. Notch Filter

An ideal notch filter provides infinite attenuation at a single frequency, and little or no attenuation at other frequencies. This type of filter is useful in special cases where there is a single noise frequency near or below the corner frequency of the low pass filter. In such cases, use of the notch filter can provide additional attenuation for a troublesome noise source and may permit opening the pass band of the low pass filter for a faster step response. The IND256x implements the notch filter as a Finite Impulse Response (FIR) filter, and provides the fundamental notch plus additional notches at multiples of the fundamental notch frequency. Specifying the notch frequency in Hz

adjusts the notch filter. The notch filter is applicable to all weighing applications, but only to the Analog Load Cell scale.

3. Ultra-Stability Filter

Ultra-Stability Filtering algorithm is for use in transaction applications where it is very difficult to achieve stable weight readings due to excessive motion on the scales. Examples are truck scales in very windy locations and livestock weighing scales. The Ultra-Stability filtering algorithm uses the standard low-pass filtering as long as there is a rapid motion on the scale so that the operator can also observe the weight changing. When the motion begins to die down, this algorithm switches to a very stiff filter that strongly dampens any noise on the scale. Then, the operator can record a stable weight reading. Process weighing applications cannot use the ultra-stability filter, since the non-linear action of the filter switching may cause inaccurate cutoffs in batching or filling applications.

3.2.2. Scale Tare Setup (CT)

Access: "Admin" default level is customizable by individual field.

Class Code: ct

Instances: 1

Attributes:

ct0100	Composite ct block	Struct	na	Composite of entire block
ct0101	Tare Enabled	Bl	na	1 = enable Tare feature.
ct0102	Pushbutton Tare Enabled	Bl	na	
ct0103	Keyboard Tare Enabled	Bl	na	
ct0104	Auto-Tare Enabled	Bl	na	
ct0105	Re-arm Autotare No Motion	Bl	na	1 = re-arm autotare only when there is no motion after weight falls below re-arm threshold (wk0102)
ct0106	Auto-Clear Tare Enabled	Bl	na	1 = automatically clear tare when weight falls below auto-clear weight threshold (wk0103)
ct0107	Auto-Clear Tare after Print	Bl	na	
ct0108	Auto-Clear Tare Motion	Bl	na	
ct0112	Weights & Measures Interlock	Bl	na	
ct0113	Net-Sign Correction Enabled	Bl	na	
ct0115	Additive Tare Enabled	Bl	na	
ct0118	Reset tare on power-up	Bl	na	0 = Restart with current tare, 1 = Reset the tare to zero on power-up.
ct0119	Clear Tare on Zero	Bl	na	1 = Clear Tare when scale is zeroed

Methods

Tare is the weight of an empty container. The IND256x can mathematically eliminate this weight from the gross weight and show only the contents, or net weight. The IND256x always displays the gross, net, and tare weights using the same display resolution and units. The IND256x always has tare weight available for recall and display, and it always identifies the tare weight. A tare weight of zero is illegal.

There are several Methods for capturing tare:

- **Pushbutton Tare** captures current weight reading as the tare weight upon operator command, at highest internal weight resolution available. There must be no motion on the scale for 3 seconds.
- **Auto-Tare** captures the current weight as the tare weight when the current weight exceeds the upscale threshold weight, wk0101, and the scale reaches a "no motion" state. The IND256x resets the auto-tare trigger when the weight falls below a downscale threshold, wk0102, and the scale is in an optional stable weight condition. There must be no motion on the scale
- The IND256x accepts a Keyboard Tare or a Programmable Tare at either display resolution or full internal resolution. The operator may recall tare on demand. Application specific software packages can set the Programmable Tare weight in wk0104. The IND256x rounds the Tare to the scale display resolution before using it in calculations. Canadian W&M requires keyboard tare to be entered at the scale display resolution.

Auto-Clear Tare operates in conjunction with Auto-Tare. It automatically clears the tare after the weight exceeds an upscale weight threshold, a stable reading achieved, followed by the weight returning below Auto-Clear Tare threshold, wk0103. You may also set the IND256x to automatically clear tare after the IND256x prints.

Net Sign Correction delays the decision of which weighment is the gross weight and which weighment is the tare weight until the operator prints the ticket. At that time, the IND256x compares the two weighments and takes the lower weight as the tare weight, so the net weight is always a positive value. It resolves this dilemma:

- weigh a full truck first and, after emptying the truck, take the tare weight of the empty truck to find the net weight of the contents.
- take the tare weight of an empty truck first and, after loading the truck, take the full weight of the truck to find the net weight of the contents.

Weights & Measures Compliance

Tare Interlock, which is the only tare configuration field the Weights & Measures seal protects, enforces the following operations:

- In Europe & Australia, you may do incremental chain tares only.
- In USA, you cannot do chain tares.
- You only capture tare in first range of a multi-range or multi-interval scale.
- You must capture Power-Up zero before capturing a Tare weight.
- You may clear tare only at Gross zero.

In **Multi-Interval** weighing, in Europe and Australia, you may take Pushbutton and AutoTare in any interval. In legal for trade mode, Preset Tare entries must be within the lowest interval. The IND256x generates an error message when the entry is too large. If not in legal for trade mode, Preset Tare entries may be in any interval. In the U.S. legal-for-trade mode, all tare entries must be in the lowest weighing range.

3.2.3. Scale Monitoring Setup (CM)

Access: "Service" default level is customizable by individual field.

Class Code: cm

Instances: 5

Attributes:

cm0100	Composite cm block	Struct	na	Composite of entire block
cm0101	Next Scheduled Calibration Date	AL2	na	In 1second intervals since 1970
cm0102	Last Calibration/Service Date	AL2	na	In 1seconds intervals since 1970. For Analog, this is the last calibration date.
cm0103	Calibration Interval in Days	US	na	Max number of days between calibrations
cm0104	Calibration Interval in Weighments	L	na	Number of weighments between calibrations
cm0107	Cal Expired Announcement	By	na	1 = log only, 2 = disable scale and alarm, 3 = email alert and alarm, 4 = alarm only.

Methods

Calibration Checking. The IND256x can enforce Calibration Checking within a certain interval. The Service Technician specifies the interval either in number of days or weighments. Calibration Checking helps the Service Technician test and certify the accuracy of the scale. The scale must weigh test weights within a specified tolerance in the specified number of locations on the scale platform. The Service Technician can certify the scale "as found" if he knows that the scale is weighing accurately. The IND256x prints a receipt of the Calibration Check procedure, and saves the results in the Calibration Check Log. The IND256x can disable the scale, issue a local alert, or email a general alert when the calibration check fails.

3.2.4. System Setup (XS)

Access: "Service" default level is customizable by individual field. The following fields have "Administrator" level security: xs0101, xs0102, xs0122 and xs0128. The following fields have "Read Only" level security: xs0103, xs0104, xs0133, xs0134, xs0141, xs0151, and xs0152.

Class Code: xs

Instances: 1

Attributes:

xs0100	Composite xs block	Struct	na	Composite of entire block
xs0101	Market	By	na	0 = USA, 1 = European Community, 2 = Australia, 3 = Canada, 4 = Thailand
xs0102	Legal for Trade	By	na	0 = no, 1 = yes
xs0104	Software Part Number	S15	na	Part #'s are 14 digits + null terminator
xs0105	service Phone Number	S14	na	Default:4008878989
xs0106	IND256x ID	S21	na	Terminal ID
xs0107	IND256x Project ID	S21	na	Project ID
xs0108	IND256x Terminal ID	S41	na	User Textual Description of the IND256x
xs0110	Date format	By	na	1 = MM_DD_YY, 2 = MMM_DD_YYYY, 3 = DD_MM_YY, 4 = DD_MMM_YYYY, 5 =

				YY_MM_DD, 6 = YYYY_MMM_DD, 7 = YYYY_MM_DD, 0 = none
xs0111	Time Format	By	na	1 = 24_MM, 2 = 12_MM, 3 = 24_MM_SS, 4 = 12_MM_SS
xs0112	Date Separator	S2	na	"/" = slash, "-" = hyphen, "." = period, " " = space, 0 = none
xs0115	Operator Message Language	By	na	0 = English, 1 = French, 2 = German, 3 = Spanish, 4 = Chinese, 5 = Italian, 6 = Portuguese, 7 = Polish
xs0116	Contrast Adjustment	By	na	# number of steps to increase (+) or decrease (-) contrast adjustment 0x7f = Reset Contrast Adjust
xs0117	Modbus address MSB	By	na	
xs0118	Modbus Communicate port	By	na	0 = none, 1 – 3 = COM port 1 - 3
xs0119	Modbus address	By	na	
xs0121	Backlight Timeout	US	na	In minutes: 0 = never,1 = 1 min, 2 = 5 min, 3 = 10 min, 4 = always on
xs0122	Local Gravity "Geo" Code	By	na	Value from 0-31.This value represents the gravitational acceleration depending on the latitude and altitude at this specific location where the IND256x is now operating. The IND256x uses it to adjust the weight value when you calibrate it in one location and use it in a different region of the world. Any value other than 0-31 disables this feature.
Hardware Configuration				
xs0128	Restart/reset weight unit while power up	By	na	0 = start up at primary weigh unit. 1 = start up at current weigh unit.
xs0129	Limited Access External BRAM	By	na	0 = Full Access External BRAM 1 = Limited Access External BRAM
xs0130	Reserved	By	na	
xs0132	Battery set flag	Bl	na	Indicates whether user has set the battery type. 0 = Not set, 1 = Set
xs0135	Screen Saver Timeout	L	na	time before turning off display. 0-turn off screen saver, 1 = 1 min, 2 = 5 min, 3 = 10 min, 4 = 30 min
xs0136	The metrology control number	L	na	the beginning value is 1
xs0138	Second SDSV port number	L	na	The IND256x always has a default Shared Data Server open on port 1701. Default = 1701
xs0140	Display Content on System Line	By	na	0 = None, 1 = Discrete I/O, 2 = Date/Time, 3 = Discrete I/O and Date/Time
xs0141	Battery power installed	By	na	0 = None, 1 = Li Battery, 2 = NiMH Battery
xs0142	backlight adjust level	By	na	# number of steps to increase (+) or decrease (-) backlight adjustment 0x7f = Reset backlight adjust
xs0150	Boot Software ID Number	S21	na	Textual Description of the Installed Software
xs0154	certificate # number	S21	na	certificate # number

xs0155	Repeat print	By	na	0 = Disable, 1 = footer, 2 = header
xs0156	Battery Operation	By	na	0 = Disable, 1 = Enable
xs0157	Auto Power Off	By	na	0 = Disable, 1 = 10 minutes, 2 = 30 minutes, 3 = 60 minutes
xs0158	Reconnect mode	By	na	0 = Disable, 1 = Automatic, 2 = Manual

3.2.5. Database Setup (DS)

Access: "Service" default level is customizable by individual field.

Class Code: ds

Instances: 1

Attributes:

ds0100	Composite ds block	Struct	na	Composite of entire block
Setpoint Target Table Settings				
ds0111	Setpoint Target Comparison Mode	By	na	0 = None, 1 = Material Transfer, 2 = Over/Under
ds0112	Setpoint Target Output Mode	By	na	0 = Concurrent Setpoint Outputs (during fast feed cycle, feed and fast feed are on together), 1 = Independent Setpoint Outputs (during feed cycle, feed and fast feed are on separately,
ds0113	Setpoint Tolerance Entry	By	na	The operator enters setpoint tolerance values: 0 = Weight Deviation from Target, 1 = Absolute Weight Value, 2 = % Deviation from Target
ds0114	Target Description In Report	Bl	na	1 = enabled
ds0115	Target Value In Report	Bl	na	1 = enabled
ds0116	Target Tolerances In Report	Bl	na	1 = enabled
ds0117	Target Spill Value In Report	Bl	na	1 = enabled
ds0118	Target Fine Feed Value In Report	Bl	na	1 = enabled
Tare Totalization Table Settings				
ds0121	Tare Totalization Weight	By	na	0 = none, 1 = Gross Weight, 2 = Net (Displayed) Weight
ds0122	Tare Description Enabled	Bl	na	1 = enabled
ds0123	Clear Totals on print	Bl	na	1 = enabled
ds0124	Tare Value In Report	Bl	na	1 = enabled
ds0125	Tare Description In Report	Bl	na	1 = enabled
ds0126	Tare N Value In Report	Bl	na	1 = enabled
ds0127	Tare Total In Report	Bl	na	1 = enabled

Method

The application uses the Setpoint Target Settings for building a table of Setpoint Targets.

The application uses the Global TareTotalization Settings for building a Tare Settings Table. The Formatted Output Server (FOS) in the Resident Scale Task adds the weight for each completed transaction to the Tare Totalization totals.

The IND256x has four Standard Database tables that the user can assign for specific purposes, such as Setpoint Targets and Tare Totalization. Please refer to the description of the Standard Database Tables in the Data Description (DD) Section.

3.2.6. Power-Up Weight Display (XA)

Access: "Service" default level is customizable by individual field.

Class Code: xa

Instances: 1

Attributes:

xa0100	Composite xa block	Struct	na	Composite of entire block
xa0101	Set Weight Display Visible	By	rt	1 = Set Visible (default). 2 = Set Invisible.
xa0102	Set Delta Track Display Visible	By	rt	1 = Set Visible. 2 = Set Invisible (default).
xa0111	Set Scale Platform Weight Height	By	rt	Set Height of ScalePlatform Weight display. 0 = None, 1 = Small (6.1 mm), 2 = Medium (11.2 mm) (default), 3 = Large (16.9 mm)
xa0114	Tare Display	By	rt	0 = Never, 1 = Tare display when active, 2 = Tare always display
xa0116	Set Delta Track Height	By	rt	Delta Track Display Height: 0 = None, 1 = Small, 2 = Medium (default), 3 = Large

Method

This block contains the power-up settings for the Weight and Delta Track Display. Changes to these settings only take effect on power-up. To change dynamically the weight display appearance, make settings in the XB block.

SmartTrac Weight Display

None - Large xa0101 = 1, xa0102 = 2, xa0111 = 3, xa0116 = 0
Small - Medium xa0101 = 1, xa0102 = 1, xa0111 = 2, xa0116 = 1
Medium - Small xa0101 = 1, xa0102 = 1, xa0111 = 1, xa0116 = 2
Large - None xa0101 = 2, xa0102 = 1, xa0111 = 0, xa0116 = 3

3.2.7. System Logs Setup Data (XR)

Access: "Service" default level is customizable by individual field, but xr0203,xr0303,xr0403 and xr0503 are administrator level

Class Code: xr

Instances: 4
- Instance 1 = Monitor/Maintenance Log
- Instance 2 = Transaction History (Alibi Memory) Log
- Instance 3 = Error log
- Instance 4 = Application log

Attributes:

xr0100	Composite xr block	Struct	na	Composite of entire block

xr0101	Number of Bytes in Log File	UL	na	Nuber of Bytes in Log File
xr0103	Enable logging	BI	rt	Enable/disable logging.

For xr0203 definition is as follows:

0 : None

1 : Alibi memory enable

2 : Action Log enable

3 : Transaction Log enable

- Note: Only instances 1, 2, and 3 can be enabled/disabled.

Method

The IND256x maintains five log files in Compact Flash. The Service Technician can use FTP to transmit each of these files to a host PC. The log files are circular log files.

The "**Monitor Log**" is a circular log file that contains a record of the significant processing events that may affect the "health" of the scale system. It aids the Service Technician in resolving problems and in deciding what service he needs to perform on the IND256x. The Service Technician can select the items recorded in the log. The "Scale Monitoring Setup" block in Shared Data holds these selections.

The "**Transaction Log**" (Alibi Memory) is circular log file that contains historical record of all the transactions performed on the IND256x. The Demand Print operation defines a transaction on the IND256x; the Demand Print Setup block specifies the requirements for legal Demand Print operations. Each Alibi Memory record has a fixed format field containing the date, time, scale identifier, net weight, tare weight, tare source, and consecutive number for each transaction. The user may specify a special Print Template for additional data that the IND256x adds to each record.

The "**Calibration Log**" is a circular log file that maintains the history of all the scale calibrations and calibration checks.

The "**Configuration History**" is a circular log file that contains a complete record of the changes made to Shared Data Setup and Calibration fields. It provides an audit trail of all the changes that the Service Technician has made to the IND256x since its initial installation. This historical record is a requirement in the pharmaceutical and food industries, where companies must prove their compliance with governmental regulations. The IND256x provides warnings to the operator when this file is becoming full and disables itself when this file is finally full. Then, the Service Technician must use FTP to save the log file to a remote PC and reset the file before the IND256x will continue.

Each sector in the Compact Flash has a maximum of 300,000 writes. Each time the IND256x writes to the Compact Flash, the Compact Flash re-writes an entire sector. There are typically multiple records per sector. In logging, we need to minimize the number of write to the Compact Flash to prevent premature wear-out of the Compact Flash. This is a potential or likely problem with four logs – Error Log, Monitor Log, Transaction Log, and Configuration Log. However, it should not be a problem with the Calibration Log because the operator does not do calibrations or calibration checks frequently.

- The Log Files reside in Compact Flash in the \Storage Card\IND256x\HIS directory.
- The Logger creates Log Files that are static files of fixed file size, fixed record size, and a fixed number of records. This prevents re-writing the file directory each time that we write to the Log File. We can set the fixed record size to 64 characters or 128 bytes.

- The Log Files are circular files where the IND256x re-writes the oldest record first. However, we do not overwrite the oldest record in the Configuration Log only until the user clears the log.
- The Logger buffers 16 log records (1K bytes) in BRAM Shared Data until the buffer becomes full. When the buffer is full, the Logger should write the entire 1K block to the Log File at once, and clear the BRAM buffer.
- The Logger allocates the Log File sizes in 1K byte increments only.
- Fields in BRAM Shared Data point to the current position in the Log File.
- The Logger must support a "flush" command where it writes the current contents of the BRAM buffer to the Log File, even if it is not full.
- The Logger needs to take into account the end-of-file, wrap-around conditions where a BRAM buffer may be split between the end and beginning of the file.
- The Service Technician can use FTP to read the Log Files through FTP.
- When the Service Technician reads the Log Files through FTP, FTP issues a command to the Logger to flush the BRAM buffer to Compact Flash Log File before transmitting the Log File to the host.
- FTP also has a "reverse sort order" option where it transmits the Log File to the host in newest to oldest record order. To do this, each log file has a "phantom" file that the user may retrieve via FTP. FTP formats the phantom file with most recent log message first so that log messages appear in newest to oldest chronologic order. There are at most xr01-05 messages in this file. This file name is "filename_rso.log", where "rso" stands for reverse sort order; for example, Error_rso.log, Monitor_rso.log, and SDHistory_rso.log.

3.2.8. Static Home SoftKey Page (KH)

Access: "Service" default level

Class Code: hp

Instances: 1. Instance 1 is the home page.

Attributes:

kh0100	composite hp block	Struct	na	Composite of entire block
kh0105	softkey 1	S3	rt	"
kh0119	softkey 15	S3	rt	

Method

The SoftKey Manager uses this Static Home Page from permanently stored flash memory to initialize the Dynamic SoftKey Home Page, kp0100, to begin processing the SoftKeys. The Control Panel application configures the Home Page.

3.2.9. Demand Print Setup (DP)

Access: "Service" default level is customizable by individual field.

dp0102 has "Administrator" default level

Class Code: dp

Instances: 1

Attributes:

dp0100	Composite dp block	Struct	na	Composite of entire block
dp0101	Enable Auto-Print	BI	na	1 = yes
dp0102	Ensure No Motion before Printing	BI	na	1 = yes
dp0103	Print Threshold	D	na	Weight threshold for Auto-Print and Scale Weighment Monitoring in primary weight units.
dp0104	Print Reset Threshold	D	na	Weight threshold for resetting Auto-Printand scale weighment monitoring in primary weight units.
dp0105	Minimum Print Threshold	D	na	Minimum print threshold for demand print
dp0107	Print Interlock Enabled	BI	na	1 = enable print checks, 0 = disabled
dp0108	Weight Deviation Print Threshold	D	na	Auto-Print when this absolute weight deviation occurs from the last printed weight.

Method

The **Demand Print** command is a "transaction" print command. A local operator, an external operator, or a remote device can generate a print command. When the Resident Scale Task receives a Print command, it formats and stores weight and other data as a transaction record for the scale or flow meter channel. It forwards the transaction record to one or more destinations, which could include a printer, Alibi (transaction) memory, or a remote device. The Resident Scale Task rejects Print command when:

- The scale weight is less than the Minimum Print Weight.
- The scale is in motion, when dp0102 is enabled.
- After generating a print, the Resident Scale Task has not reset the print trigger because the weight has not gone below the print reset threshold, when dp0101 selects auto-printing.

Auto-Print is Demand Print command that operates in conjunction with the Print Threshold and the Reset Print Threshold. When the scale weight goes above the Print Threshold and there is no motion the scale, the Resident Scale Task automatically generates a demand print. When the scale goes below the Print Reset Threshold, the Resident Scale Task re-enables the next print.

Print Connections Table associates a logical print command with one or more physical print devices and print messages. The Print Template Setup specifies the format of the print messages. **Scale Monitoring** uses these settings to count the number and size of the scales' weighments.

The Weights and Measures seal protects the print configuration.

3.2.10. Transaction Number Setup (XN)

Access: "Service" default level is customizable by individual field.

Class Code: xn

Instances: 1

Attributes:

xn0100	Composite xn block	Struct	na	Composite of entire block
xn0101	Transaction Number Enable	BI	na	0 = no, 1 = yes
xn0103	Transaction Number Preset	L	na	Preset value to reset the transaction counter
xn0105	Transaction Number Reset	BI	na	0 = no, 1 = yes

	Enable			
xn0106	Transaction log config assignment	AL4	na	0 = none, 1 = "SCALENA.", 2 = "TRANSDSC", 3 ="TARGETVAL", 4 = "TARGET-", 5 = "TARGET+", 6 = "RESULT", 7 = "STRING1", 8 = "STRING2", 9 = "STRING3", 10 = "ID1INDEX", 11 = "ID2INDEX", 12 = "ID3INDEX", 13 = "ID1DESC", 14 = "ID2DESC", 15 = "ID3DESC",

Method

The Resident Scale Task increments the Transaction Number (TN) each time the IND256x receives a "Demand Print" request for the specified print destination. Range is 1-999,999,999. The user may specify starting value for the TN register in the "Preset". The Weights and Measures seal does not protect the TN configuration. In JagXtreme, the Transaction number was called the Consecutive Number.

3.2.11. Totalization Setup (TS)

Access: "Supervisor" default level is customizable by individual field.
only ts0101 and ts0100 are Service level

Class Code: ts

Instances: 1

Attributes:

ts0100	Composite ts block	Struct	na	Composite of entire block
ts0101	Grand Total Enable	By	na	Automatically add Demand Print weight to Grand Total weight: 0 = no, 1 = Gross Weight, 2 = Net Weight.
ts0102	Clear Grand Total on Totals Print	BI	na	0 = no, 1 = Clear the Grand Total after printing the Grand Totals.
ts0103	Subtotal Enable	By	na	Automatically add Demand Print weight to Subtotal weight: 0 = no, 1 = Gross Weight, 2 = Net Weight.
ts0104	Clear Subtotal on Totals Print	BI	na	0 = no, 1 = Clear the Subtotal after printing the Subtotals.

Method

Each time a demand print transaction occurs, the IND256x adds the weight value to the totalization for each scale, according to the setup selections in this block. The Excalbur saves totals in primary units only.

Scale Grand Totals, SubTotals, and Sequential Numbers are stored in the TZ block in process data.

The Sequential Number is a Transaction Number that the IND256x keeps separately for each scale.

3.2.12. Data Connections Setup (DC)

Access: "Service" default level is customizable by individual field.

Class Code: dc

Instances: 20

Attributes:

dc0100	Composite dc block	Struct	na	Composite of entire block
dc0101	Output Connection Type	By	na	0 = none, 5 = demand print. 6 = continuous output, 7 = EX200 continuous output. 8 = reports
dc0102	Input Connection Type	By	na	0 = none, 1 = scale commands, CTPZ-style, 2 = scale commands, SICS Slave Level 0 & 1, 3 = bar codes, 14 = Shared data server
dc0104	Output Trigger	By	na	Entity that triggers output: 0 = None, 1 = Scales 1, 6 – 8 = Custom Print 1 – 3
dc0105	Print Template(s)	ABI 11	na	An array with one element for each templateEntry 1: 1 = use default template. Entry 2-6: 1 = Connection uses this template 1-5.
dc0106	Address	By	na	
dc0108	Add Checksum	BI	na	1 = Add checksum to end of output string

Method

You can establish Data Connections to Serial Port. There is a separate instance of the DC class for each data connection. You may only specify a single output type OR a single input type in each connection instance – not both. An SICS command connection is an exception; it is both and input and an output connection.

Here are some rules for configuring data connections:

- Demand print and Continuous print connections CANNOT share the same IO port.
- An input connection CANNOT share the same IO port with another input connection.
- Multiple demand print and custom print connections CAN share the same IO port.
- Demand OR Continuous print connections CAN share an IO port with a single Input-only connection, such as CTPZ-command connection or a bar-code reader connection.
- An SICS-connection must have exclusive use of its IO port since it does bi-directional IO.
- You can configure multiple continuous print connections to a single IO port. However, the RST only sends the data from a single "selected" scale at a time.
- When you select a multi-continuous data connection, you must also configure a Summing Scale. The RST uses the trigger from the Summing Scale in order to guarantee that the weight data from all scales is metrologically consistent.
- Custom applications must have exclusive use of their IO ports for communicating bi-directionally with a custom device. However, they CAN share a port with demand print and custom print connections when the application is doing output-only operations.
- Only the first LPRINT connection definition is valid.
- Only the first Continuous Standard connection for each scale is valid.
- Only the first Continuous Template connection for each scale is valid. The maximum length of Template Continuous Output string is 200 characters.
- Only the first Continuous Multiplexed connection is valid.

The RST uses the "Output Trigger" parameter for determining which device or command can trigger the print operations for the connection. Shared Data commands for each device initiate the demand or continuous print operations. Shared Data commands trigger the custom print operations.

The **TCP/IP Console Print Server** enables one or more remote client programs to receive print data from the IND256x. The remote clients can be WINDOWS PC Visual Basic applications or other TCP/IP host programs. You must first enable the TCP/IP Console Print Server Print Connection. Then, whenever a remote client establishes a TCP/IP connection, the Console Print Server sends the LPRINT data, the demand and custom print data, and the console log data to the client across the TCP/IP connection to the remote client. The Console Print Server uses TCP/IP port 1701 for establishing connections.

The IND256x Console Print Server sends only the specific output selected by the Output Connection and LPRINT device parameters in the TCP/IP data connection instances. This is different from the JagXtreme, where the Print/Console Server sent many types of serial data together over the TCP/IP connection.

In order to route print connection data to a remote IND256x terminal IO port, you must setup locally an output connection to a TCP/IP port. In the remote IND256x terminal, you must configure a "Network Print Client" to fetch the data and route it to the proper IO port.

The TCP/IP Console Print Server routes input data that it receives, as keystrokes to the SoftKey Manager/Keyboard Routing. Then, using this connection, a remote client can submit keystrokes to the IND256x.

Each demand print, custom print, or Iprint message have a <dprint> and </dprint> delimiter tags to denote the beginning and end of the message, and they may span multiple messages. The Print Client and destination Serial Services task must print the data within the beginning and ending tags sequentially and consecutively so that messages from different terminals do not become intermixed.

3.2.13. Print Templates Setup (PT)

Access: "Service" default level is customizable by individual field.
Class Code: pt
Instances: 1
Attributes:

pt0100	Composite pt block	Struct	na	Composite of entire block
pt0101 pt0105	Print Templates 1–5	ABy51	na	Printer Template – Refer to section D6 in Appendix D, **Communications**
pt0121	Template1 print width	By	na	
pt0122	Template2 print width	By	na	
pt0123	Template3 print width	By	na	
pt0124	Template4 print width	By	na	
pt0125	Template5 print width	By	na	
pt0131	Template1 Separate char	By	na	',' ';' '|' '~' '^'
pt0132	Template2 Separate char	By	na	
pt0133	Template3 Separate char	By	na	
pt0134	Template4 Separate char	By	na	

pt0135	Template5 Separate char	By	na	
pt0141	Template1 print type	By	na	0 = Fixed width, 1 = Single line, 2 = EX200 format, 3 = Label Print format
pt0142	Template2 print type	By	na	
pt0143	Template3 print type	By	na	
pt0144	Template4 print type	By	na	
pt0145	Template5 print type	By	na	
pt0151	Template1 EX200 printout format	By	na	1 = Single line display weight, 2 = Single line G/T/N display weight, 3 = Multi-line G/T/N display weight
pt0152	Template2 EX200 printout format	By	na	
pt0153	Template3 EX200 printout format	By	na	
pt0154	Template4 EX200 printout format	By	na	
pt0155	Template5 EX200 printout format	By	na	
pt0161	Line Feed After template1 print	By	na	
pt0162	Line Feed After template2 print	By	na	
pt0163	Line Feed After template3 print	By	na	
pt0164	Line Feed After template4 print	By	na	
pt0165	Line Feed After template5 print	By	na	
pt0170	Print title language select	By	na	0 = none, 101 = English, 201 = chinese
pt0171	Select printer	By	na	0 = others, 1 = PQ16

Method

Templates are a method to configure both data content and data format in print messages. A Template is a user specific "program" that the RST Template Interpreter executes to build a print message. A Template defines a serial data stream that the IND256x transmits to a printer, sends to a host computer, or writes to a data file. The IND256x supports template nesting. Templates make use of the encapsulation of related data fields, e.g., weight data is not a composed of 10 isolated fields but is instead a single object having many highly correlated attributes, such as gross, tare, net, units, and tare mode. These attributes remain internally consistent at all times. The Weights and Measures seal does not protect Template editing.

The user can build a template using the basic template configuration screen provided in the terminal at **Setup I Communication I Templates I Output** (refer to chapter 3, **Configuration**), or a remote PC label design program (refer to section D6 in Appendix D, **Communications**).

3.2.14. Barcode Input Templates Setup (BT)

Access: "Service" default level is customizable by individual field.
Class Code: bt
Instances: 1
Attributes:

bt0100	Composite bi block			
bt0101	Preamble length	By	na	Length of data ignored at beginning of message
bt0102	Max data length	By	na	Maximum input data length
bt0103	Postamble length	By	na	Length of data ignored at end of message before the termination character
bt0104	Termination character	By	na	Teminate input whenever this character is encountered
bt0105	Application Use	By	na	1 = tare value, 2 = tare ID, 3 = target ID 4 = keypad for the input

Method

Resident Serial Services parses a Barcode Input string based on the message definition in the Barcode Template BT Setup fields and stores the message in the Shared Data Message Block. The Data Connections DC Setup fields assign the BT template processing to a Serial port.

3.2.15. Report Print Templates Setup (RT)

Access: "Service" default level is customizable by individual field.
Class Code: rt
Instances: 1
Attributes:

rt0100	Composite bi block			
rt0102	Blank Header Lines	By	na	# blank lines in header
rt0103	Print Standard Title	Bl	na	0 = no, 1 = yes
rt0104	Record Separator	By	na	0 = none, 1 = '*', 2 = '-', 3 = ' = ', 4 = 'CR/LF'
rt0105	Blank Footer Lines	By	na	# blank lines in footer

Method

RST uses the Report Template settings for printing the Standard Terminal reports.

3.2.16. Serial Port Setup (RP)

"Service" default level is customizable by individual field.

Class Code: rp
Instances: 3
Attributes:

rp0100	Composite rp block	Struct	na	Composite of entire block
rp0101	Interface Type	By	na	0 = RS232, 1 = RS422, 2 = RS485

rp0102	Baud Rate	By	na	0 = 300, 1 = 600, 2 = 1200, 3 = 2400, 4 = 4800, 5 = 9600, 6 = 19200, 7 = 38400, 8 = 57600, 9 = 115200
rp0103	Parity	By	na	0 = none, 1 = odd, 2 = even
rp0104	Flow Control	By	na	0 = none, 1 = Xon/Xoff
rp0105	Data Bits	By	na	1 = 7 bits, 2 = 8 bits
rp0106	Stop Bits	By	na	1 = 1, 2 = 2
rp0108	Assigned Usage for Port	By	rt	0 = None, 1 = SICS Scale, 3 = Data Connection

3.2.17. Access Security Setup (XU)

Access: "Service" default level is not customizable.

Class Code: xu

Instances: 5

Attributes:

xu0100	Composite xu block	Struct	na	Composite of entire block
xu0101	User Name	S13	na	
xu0102	Password	S13	na	
xu0103	Access Level	By	na	1 = Operator, 2 = Supervisor, 3 = Service, 4 = Administrator
xu0102	Read only, and always "admin"			
xu0103	Read only, and always 4 = Administrator			

3.2.18. TCP/IP/Ethernet Network Setup (NT)

Access: "Service" default level is customizable by individual field.
nt0101 is read only

Class Code: nt

Instances: 1

Attributes:

nt0100	Composite nt block	Struct	na	Composite of entire block
nt0101	Ethernet MAC Address	S13	na	Read from Ethernet Adapter.
nt0102	Ethernet IP Address	S40	na	Default: 192.168.0.1 Used only IP address is fixed – NO DHCP
nt0103	Ethernet IP Address Subnet Mask	S40	na	Default: 255.255.255.000
nt0104	Ethernet Gateway IP Address	S40	na	Default: 000.000.000.000
nt0105	Enable Ethernet DHCP Client	By	na	0 = no, 1 = yes
nt0106	Print client IP Address	S40	na	Default: 000.000.000.000
nt0107	WiFi account name	S40	na	
nt0108	WiFi password	S40	na	

nt0109	Ethernet Mode	By	na	0 = Server Mode, 1 = Client Mode

3.2.19. Analog Output Setup (AO)

Access: "Service" default level is customizable by individual field.
Class Code: ao
Instances: 1
Attributes:

ao0100	Composite ao block	Struct	na	Composite of entire block
ao0101	Data Source	By	na	0-None, 1 = Gross Weight, 2 = Net Weight
ao0102	Source Device	By	na	1 = Scale 1
ao0103	Zero Preset	D	na	Value = Zero on Analog Output
ao0104	Span Preset	D	na	Value = Span on Analog Output
ao0105	Zero Adjustment	D	na	Manual Adjustment to Zero
ao0106	Span Adjustment	D	na	Manual Adjustment to Span

Method

The IND256x Analog Output logic always reports weight in primary units.

3.2.20. Application Installation Information (AQ)

Access: "Supervisor" default level is not customizable.
Class Code: aq
Instances: 1
Attributes:

aq0100	Composite aq block	Struct	na	Composite of entire block
aq0101	Application Type	By	na	0 = Basic Application, 1 = Check Weighing Application
aq0102	Application Name	S21	na	Application File Name
aq0103	Part Number	S14	na	
aq0104	Software Number	S14	na	

3.2.21. Application Message Table (AW)

Access: "All Users" default level is customizable by individual field.
Class Code: aw
Instances: 1
Attributes:

aw0100	Composite aw block	Struct	na	Composite of entire block
aw0101 to aw0110	String Setup Fields 1-10	S41		

3.3. Protected Process Data

Protected Process Data is stored in battery-backed RAM or some other permanent storage media that the IND256x protects across power failures. It contains process data the Resident Scale Task or the Applications may change frequently.

3.3.1. Working Scale Setup Data (WK)

Access: "Supervisor" default level is customizable by individual field.

Class Code: wk

Instances: 1

Attributes:

wk0100	Composite wk block	Struct	na	Composite of entire block
wk0101	Auto-Tare Threshold	D	rt	
wk0102	Auto-Tare Reset Threshold	D	rt	Enabled by ct–05
wk0103	Auto-Clear Tare Threshold	D	rt	Enabled by ct–06
wk0104	Programmable Tare	D	rt	Application can set this value to initiate a programmable tare command
wk0105	Rate Measurement Interval	By	na	0 = every second, 1 = every five seconds, 2016 = every half-second.
wk0106	Rate Sample Time	By	na	Number of intervals in sliding window over which the IND256x averages the rate. 1 to 60 intervals.
wk0116	Measurement uncertainty	D	na	Accuracy uncertainty entered as weight value in primary units
wk0117	MinWeigh tolerance	D	na	Values from 0.1 to 99.9
wk0118	MinWeigh safety factor	By	na	Value from 1 to 10
wk0119	MinWeigh weight value	D	na	Weight result of direct entry or calculation.
wk0125	MinWeigh weight value	D	rt	a new uncertainty value of "c"

Method

This block contains Scale Setup Data that may change during run-time. Rate settings, particularly, may change in a process control environment. In some systems, however, these fields are static setup data that never changes.

RATE is the rate of change of weight normalized to the selected weight and rate units.

- cs–08 defines the rate weight units. Cs–07 defines the rate time units in either seconds, minute, or hours.
- The Rate Calculation Interval in wk–05 specifies how often the IND256x calculates a new rate value. The permissible selections are 1 second, 5 seconds, and ½ second.
- The Rate Sample Time is in wk–06. It is length of the sampling period used for the IND256x's rate calculation. Permissible values are from 1 to 60 seconds. RATE calculates the "delta weight" or change in weight from the previous interval. RATE stores this new delta weight in an array of delta weights. It calculates the rate as an average delta weight over all intervals in most recent sample time. For example, if the sample time is set to 10 seconds and interval

time is set to one second, the rate is the normalized average of the 10 most recent delta weights. Shorter sample times reflect more accurately the instantaneous changes in the rate, but often have much greater fluctuations in rate values. With longer sample times, the rate changes more slowly and smoothly because the rate is calculated over a longer time.

- The IND256x calculates the delta weights using the fine gross weight. It stores the calculated rate in wt–14 in the "fine" resolution. RATE rounds the displayed rate to the x10 resolution of the scale's division size. For example, if the scale weight resolution is xxx.x, then displayed rate resolution is xxx.xx. It stores the displayed rate as a string in the wt–08.

3.3.2. Scale Process Data (WS)

Access: "Read Only" access level is not customizable.

Class Code: ws

Instances: 1

Attributes:

ws0100	Composite ws block	Struct	na	Composite of entire block
ws0101	Current Scale Mode	By	rt	'G' = Gross, 'N' = Net
ws0102	Rounded Tare Weight	D	rt	
ws0103	Fine Tare Weight	D	rt	
ws0104	Auxiliary tare weight	D	rt	
ws0105	Current Units	By	rt	1 = Primary, 2 = Secondary
ws0106	Tare Source	By	rt	1 = Pushbutton, 2 = Keyboard, 3 = Autotare
ws0107	Current Zero Counts	D	na	Power up zeroing, Pushbutton zeroing, &Auto-zero maintenance can modify the current zero. The "reset to factory" value is-999999.0, which tells the RST to initially set the current zero to the calibrated zero.
ws0108	Fine Stored Weight	D	na	
ws0109	Tare Source String	S3	na	"PT" = keyboard tare, else "T "
ws0110	Displayed Tare Weight	S13	na	
ws0111	Display Aux Tare Weight	S13	na	
ws0113	Old Print Weight	D		na
ws0114	Current Scale Mod	S13	na	Current scale mode in string
ws0127	Total of current tare id record	D	na	
ws0128	n of current tare id record	UL	na	
ws0129	Description of current tare id record	S21	na	

Method

The Resident Scale Task maintains its scale process data in this block. This scale process data may change frequently but must be stored permanently. The Scale Tare Setup section describes how the RST uses the tare process data in this block.

A Truck In/Out facility uses the Net Sign Correction to handle two situations:

- weigh a full truck first and, after emptying the truck, to take the tare weight of the empty truck to find the net weight of the contents.
- take the tare weight of an empty truck first and, after loading the truck, to take the full weight of the truck to find the net weight of the contents.

Net Sign Correction delays the decision of which weighment is the gross weight and which weighment is the tare weight until the operator prints the ticket. At that time, the IND256x compares the two weighments and takes the lower weight as the tare weight. Then, the net weight is always a positive value.

3.3.3. Scale Monitoring & Service Data (WM)

Access: "Read Only" access level is not customizable.

Class Code: wm

Instances: 1

Attributes:

wm0100	Composite wm block	Struct	na	Composite of entire block
wm0103	Number of weightments	since calibration	UL	na
wm0104	Number of Platform Overloads	UL	na	
wm0106	Number of Zero Commands	UL	na	
wm0107	Number of Zero Command Failures	UL	na	
wm0111	Calibration Check Failure	By	na	0 = None, 1 = Latest calibration check failed
wm0112	Number of Platform Underloads	UL	na	
wm0119	Last Transaction Day	AL2	na	Last Day that Scale Base ran at least one Transaction.
wm0120	Total Transactions Per Day	AL7	na	Total Number of Print Transactions in each of the last 7 days when the Scale Base ran at least one Transaction.
wm0121	Transaction Day Pointer	By	na	Pointer to the next Transaction day entry that the Excalibur will update, 1-7.
wm0122	Last Usage Cycle Day	AL2	na	Last Day that Scale Base ran at least one Usage Cycle.
wm0123	Usage Cycles Per Day	AL7	na	Usage Cycle counter It contains the number of times that the scale base exceeds 1% of the capacity of the base in each of the last 7 days when the Scale Base had at least one cycle.
wm0124	Usage Cycle Day Pointer	By	na	Pointer to the next usage cycle day entry that the Excalibur will update, 1-7.
wm0125	Average Peak Load	D	na	Running average of daily peak loading IND256x stores value in primary scale weight.
wm0127	Peak Load Per Day	D	na	Peak Load on the Scale Base for each of the last 7 days when the Scale Base ran at least

				one Usage Cycle. The terminal stores values in primary scale weight.
wm0128	″	D	na	
wm0129	″	D	na	
wm0130	″	D	na	
wm0131	″	D	na	
wm0132	″	D	na	
wm0133	″	D	na	
wm0134	Peak Load	D	na	Peak Load on the Scale Base

Method

The Scale Monitor counts significant processing events and errors for each scale platform. The Scale Monitoring Setup Block, cm, defines what events the Scale Monitor watches.

3.3.4. System Monitoring & Service Data (XP)

Access: "Service" default level is customizable by individual field.

Class Code: xp

Instances: 1

Attributes:

xp0100	Composite xp block	Struct	na	Composite of entire block
xp0101	Transaction Counter	UL	na	Transaction counter incremented according to the Transaction Counter Setup. In JagXtreme, this was the Consecutive Number counter. FTP does not restore this field.
xp0103	IND256x Accumulation Total	D	na	Transaction Weight Accumulation SubTotal for IND256x.
xp0112	Power Cycle Counter	UL	na	Number of times power has cycled since installation of this IND256x
xp0113	Current Power On Time Counter	UL	na	Current Power On Time counter in minutes. It contains the number of minutes that the IND256x power has been on since it last powered up.
xp0114	Usage Time Counter	UL	na	Cumulative Usage Time counter in minutes. It contains the cumulative minutes that any scale base weight is above 1% of the scale capacity.
xp0117	Total Power On Time Counter	UL	na	Cumulative Power On Time counter in minutes. It contains the cumulative minutes that the IND256x power has been on.
xp0120	Last Demand/Custom Print Dest	UL	na	Destination of last demand or custom print. DUPLICATE PRINT uses it to route a duplicate print request to the last destination(s). This field can contain up to 4 destinations.

Method

The System Monitor maintains the system usage counters. The FTP Shared Data transfer saves these usage counters but does not restore them. "xp0102", which FTP restores, is the only exception.

3.3.5. Scale Totalization Process Data (TZ)

Access: "Supervisor" default level is customizable by individual field.

Class Code: tz

Instances: 1

Attributes:

tz0100	Composite tz block	Struct	na	Composite of entire block
tz0101	Grand Total Weight	D	na	Grand Total Weight
tz0102	Grand Total Transaction Counter	UL	na	Grand Total Transaction Counter
tz0103	Subtotal Weight	D	na	Subtotal Weight
tz0104	Subtotal Transaction Counter	UL	na	Subtotal Transaction Counter
tz0106	Last Weight When Total	D	na	

Method

Each time a demand print transaction occurs, the IND256x adds the weight value to the totalization for each scale, according to the setup selections in the TS block. The IND256x saves totals in primary units only.

The Sequential Number is a Transaction Number that the IND256x keeps separately for each scale.

3.3.6. Simple Setpoint Process Data (SD)

Access: "Supervisor" default level is customizable by individual field.

Class Code: sd

Instances: 7

Attributes:

sd0100	Composite sc block	Struct	na	Composite of entire block
sd0101	Name Descriptor	S21	na	Text name describing the Target
sd0102	Target is Active	By	na	RST sets = 1 when the Target is active, = 0 when Target is disabled.
sd0103	Shared Data source field	S7	na	Points to a Shared Data source field to be compared to coincidence target
sd0104	Operational Mode	By	na	0 = None, = Immediate, 2017 = Timed Pulse, 2018 = Time Delay, 4 = Weight, 5 = Timed Pulse After Weight, 6 = Time Delay After Weight, 7 = Weight Range
sd0105	Target Coincidence Value	D	na	Units must be the same as sd–03.
sd0106	Latching-Type Target	BI	na	0 = non-latching-type, 1 = latching-type. Used in weight-only modes.

sd0107	Target Is Latched State	Bl	na	If latching is set, the Target sets this field to1 when it first encounters the Target coincidence. After power recovery or a scale error, an active latching Target comes up in pause state. An application must issue a restart command to continue. The application must reset this bit to 0 to start next Target processing.
sd0108	Target Comparison Operator	By	na	1 = ' < ', 2019 = ' < = ', 2010 = ' = ', 4 = ' <> ', 5 = ' > ', 6 = ' > = '
sd0109	Second Weight Range Value	D	na	Used as a second target coincidence value in Weight Range mode; units must be the same as sd–03.
sd0110	Second Weight Comparison Operator	By	na	1 = ' < ', 2021 = ' < = ', 2022 = ' = ', 4 = ' <> ', 5 = ' > ', 6 = ' > = '
sd0121	Target Is Paused	By	na	0 = running, 1 = paused. RST sets this field upon command from the application
sd0127	Target State	By	na	Target State
sd0130	CP Source for Comparator	By	na	CP uses this field to determine SD field that is the source comparator: 0 = none, 1 = displayed, 2 = gross, 3 = rate, 4 = application, 5 = ABS – Displayed Weight, 6 = ABS – Rate

Method

Simple Target Operation

In its simplest form, a Target is a comparator having two numeric data inputs and one binary output. One of the two numeric data inputs is a Coincidence (or Target) Value, which an application may update at any time. The other numeric data input is any available shared data stream. The data stream choices include gross weight shared data item that generates a callback. You may associate the logical output of a Target with a physical Discrete Output or may use as an internal status.

Binary Result = Source value <comparison operator> Coincidence Target value

The SD block contains the Simple Target Process Data. An application uses SK block to issue the Simple Target commands. The RST maintains the Simple Target status in the SS block. An application can set up a feed using an SD instance, can start the Simple Target feed using the corresponding SK instance, and can monitor for its completion using the statuses in the corresponding SS instance.

The application must first setup a SimpleTarget Instance to use it. At minimum, it must setup the Shared Data source field, the Operation Mode, the Target Coincidence Value, and the Target Comparison Operator within the SD Instance. To start the feed, the application then sets the Restart Target command, sk–01 = 1. This triggers a callback to the Resident Scale Task (RST) to process the SD instance. When it is ready to begin feeding, the Resident Scale Task turns on the Target in Progress status, ss–06 = 1. When the feed is complete, the RST turns off the Target in Progress bit. The application monitors the Feeding in Progress bit in the SS instance to see when the feed starts and when the feed completes.

Operational Modes

- "Immediate" mode sets the feeding status (ss–03) to the "immediate mode output state" (sd–14).
- "Timed Pulse" mode starts the timer immediately when the application starts the Simple Target and sets the feeding status *on.* When the timer expires, it sets the feeding status *off*.
- "Time Delay" mode sets the feeding status **off** until timer expires, and then sets it *on*.
- "Weight" mode reacts to the SD source field value (sd–03) as it changes. It sets the feeding status *on* when the target comparison true. It sets the feeding status *off* and sets latching bit *on* when the comparison is false.
- "Timed Pulse after Weight" mode sets feeding status *off* if target comparison true; it sets feeding status *on* when comparison is false and starts the timer. When timer expires, it sets the feeding status *off*.
- "Time Delay after Weight" mode sets feeding status *on* if target comparison true; it starts the timer when target comparison is false and sets the feeding status *off* after the timer expires.
- "Weight Range" mode sets the feeding status *on* when both target and upper weight range comparisons are true; otherwise, it sets the feeding status *off*.

Latching

The weight-only operational modes can have latching enabled or disabled (sd–06). The operational modes with timers in them will always have latching enabled. If latching is enabled, the Target Control sets the latched state (sd–07) *on* when the target comparison is true. After turning *on* the latched state, the Target Control will not turn the feed status *on* again even if the target comparison subsequently goes false. After power recovery or a scale error, an active Target with latching enabled and latched state *off* comes up in pause state. An application must issue a restart command to continue the Target control. Before starting the next Target control processing, the application must reset latched state to *off*.

3.3.7. Full Setpoint Process Data (SP)

Access: "Supervisor" default level is customizable by individual field.
But sp0104 and sp0106 are service level

Class Code: sp

Instances: 1

Attributes:

sp0100	Composite sp block	Struct	na	Composite of entire block
sp0101	Name Descriptor	S21	na	Text name describing the setpoint
sp0102	Setpoint Enabled	By	na	0 = Setpoint Disabled, 1 Device enabling setpoint
sp0103	Shared Data field source	S7	na	Shared Data field for containing source value to be compared in setpoint.
sp0104	Target Data Stream Type	By	na	N = Displayed (Net) Weight, G = Gross Weight
sp0105	Target Coincidence Value	D	rt	For weight and jog setpoint targets, this field has a weight value. For rate setpoints, this field contains the max value that can trigger a rate alarm. For Piece Count setpoints, this field

				contains number of pieces. For LearnJog setpoints, this field contains a time value. For a Dump to Empty setpoint, this field contains the dump-completion-trigger weight.
sp0106	Latching-Type Setpoint	Bl	na	0 = non-latching-type, 1 = latching-type. Applications must set this field to enable "latching". When latching is set, the setpoint will not re-enable the feed after the device first reaches setpoint coincidence until the application resets the "latched" bit.
sp0107	Setpoint Is Latched	Bl	na	If latching is set, the setpoint sets this field to 1 when it first encounters the setpoint coincidence. The application must reset this bit to 0 to start next setpoint processing. Setpoints power-up in latched state.
sp0108	motion check	By	na	6 = classify-no motion check, 9 = classify-motion check
Ancillary Target Values				
sp0109	Preact Weight Value	D	rt	For weight setpoint targets, this field is a cutoff preact value. When this field is set, the setpoint turns off the feed when the weight = (sp–04) – (sp–09).
sp0110	Dribble Weight Value	D	rt	For two-speed feeds, this field is a feed dribble value. When this field is set, the setpoint turns off the fast feed when the weight = (sp–04) – (sp–09) – (sp—10)
sp0111	Upper Tolerance Value	D	rt	The Setpoint uses this field to determine if the actual cutoff weight falls within this specified upper tolerance. This is the last OK weight when transitioning from "in tolerance" to "over tolerance". Value is in ablsolute weight or deviation from target depending on sp–13.
sp0112	Lower Tolerance Value	D	rt	The Setpoint uses this field to determine if the actual cutoff weight falls within this specified lower tolerance. This is the first OK weight when transitioning from "under tolerance" to "in tolerance". Value is in ablsolute weight or deviation from target depending on sp–13.
sp0113	Tolerance Operation	By	na	Setpoint tolerance operation: 0 = Weight, Deviation from Target, 1 = Absolute Weight Value, 2 = % Deviation from Target same to ds0113, when setpoint is started, that value of ds0113 will be copyed to sp0113
sp0114	Upper Tolerance Percent	D	na	If sp–13 = 1, the Setpoint uses this field to calculate the upper tolerance value as a percent of the coincidence value.
sp0115	Lower Tolerance Percent	D	na	If sp–13 = 1, the Setpoint uses this field to calculate the lower tolerance value as a percent of the coincidence value.
sp0116	Drain Timer	US	na	For dump-to-empty setpoints This value is the

				amount time after hitting the dump trigger weight to leave valve open. It allows vessel to drain.
sp0117	Hold Timer	US	na	value in seconds
Visualization				
sp0118	Line1 display	By	na	0 = disable, 1 = ID, 2 = Description, 3 = Target & Tolerance, 4 = Zone
sp0119	Display mode	By	na	0 = Actual Weight, 1 = Target Difference, 2 = No Display
Misc				
sp0120	Setpoint Weight Units	By	na	0 = primary units, 1 = secondary units
sp0121	Setpoint Is Paused	By	na	0 = running, 1 = paused
sp0122	Assigned Scale	By	na	0 = Setpoint Disabled, 1 Device enabling setpoint. This field is copied to sp—02 when the setpoint is enabled.
sp0123	Motion Blanking Enable	By	na	0 = disable, 1 = enable
sp0124	Target Editing	By	na	0 = disable, 1 = Target Only, 2 = Target & Tolerance
sp0125	Target Table Enable	By	na	0 = disable, 1 = enable
sp0126	Target Table Totalization	By	na	0 = disable, 1 = enable
sp0127	Clear Totals Enable	By	na	0 = disable, 1 = Auto clear after print, 2 = Manually clear
sp0128	Transaction Table Enable	By	na	0 = disable, 1 = enable
sp0129	Print on Removal	By	na	0 = disable, 1 = enable
sp0130	Restrict Print	By	na	0 = disable, 1 = enable
sp0131	Print Threshold	D	na	weight value in current unit
sp0132	check weigh smart trac display	By	na	0 = disable, 1 = enable
sp0133	Current Target table selected ID	By	na	value range 1~ 20

3.3.8. System Log Process Data (XM)

Access: "Read Only" access level is not customizable.

Class Code: xm

Instances: 4 Instance 1 = Monitor/Maintenance Log
Instance 2 = Transaction History (Alibi Memory) Log
Instance 3 = Error Log
Instance 4 = Application Log

Attributes

xm0100	Composite xm block			
xm0104	File Next Byte Pointer	UL	na	Pointer to next byte in log file that IND256x will write, typically in fixed size records, ref XR for record size

xm0105	File Status	By	na	0 = less than 75% full, 1 = 75 to 90% full, 2023 = 90 to 99% full, 2024 = 100% full
xm0106	Buffer Next Byte Pointer	US	na	Position for next written byte to the buffer.

- Note: Only instances 1, 2, and 3 utilize these shared data elements. [xm0407 & xm0507 are large buffers available for use in BRAM space.]

Method

The Logger maintains pointers to these circular files that record system activity. Please refer to the method description in the XR block that more fully describes the Logger operation.

3.3.9. Application Integer Process Data (AP)

Access: "Service" default level is customizable by individual field.
Class Code: ap
Instances: 1
Attributes:

ap0100	Composite ap block	Struct	na	Composite of entire block
ap0101 to ap0120	Integer Fields 1-20	US	rt	

3.3.10. Application Floating Point Process Data (AF)

Access: "Service" default level is customizable by individual field.
Class Code: af
Instances: 1
Attributes:

af0100	Composite af block	Struct	na	Composite of entire block
af0101 to af0120	Floating Point Fields 1-20	D	rt	

3.3.11. ID Entry (ID)

Access: ID Entry
Class Code: id
Instances: 1
Attributes:

id--00	Composite of id block	Struct	na	Composite of entire block
id--01	Char 10	DT_S	rt	
id--02	Char 20	DT_S	rt	
id--03	Char 10	DT_S	rt	
id--04	Char 20	DT_S	rt	
id--05	Char 10	DT_S	rt	
id--06	Char 20	DT_S	rt	

3.3.12. Network Print Client Setup (NP)

Access: "Service" default level is customizable by individual field.

Class Code: None

Instances: 1

Attributes:

np0100	Composite np block	Struct	na	Composite of entire block
np0105	When Network Print Client, the Port Number	S21	na	
np0106	When Network Print Client, the server IP Address	S40	na	

3.4. Scale Board EEPROM Data

3.4.1. Scale Calibration (CE)

Access: "Service" default level is customizable by individual field.

Class Code: ce

Instances: 1

Attributes:

ce0100	Composite ce block	Struct	na	Composite of entire block
ce0103	Primary Units	By	na	0 = none, 1 = pounds, 2 = kilograms, 3 = grams, 4 = metric tons, 5 = tons
Multi-Ranging Parameters				
ce0104	Number Ranges	By	na	Multi-ranges 1, 2, or 3, Multi-intervals 4, 5
ce0105	Low Range Increment Size	D	na	Increment size is in Calibration units
ce0106	Mid Range Increment Size	D	na	Multi-ranging parameters are in Cal units
ce0107	High Range Increment Size	D	na	"
ce0108	Low-Mid Range Threshold	D	na	"
ce0109	Mid-High Range Threshold	D	na	"
ce0110	Scale Capacity	D	na	Scale capacity is in Calibration units
ce0111	Secondary Units	By	na	0 = none, 1 = pounds, 2 = kilograms, 3 = grams, 4 = metric tons, 5 = tons, 9 = ounces
Calibration Parameters				
ce0119	Calibration Units	By	na	0 = none, 1 = pounds, 2 = kilograms, 3 = grams, 4 = metric tons, 5 = tons
Standard Linear Calibration Points				
ce0120	Zero Calibration Counts	L	na	Zero calibration point for all scales
ce0121	High Calibration Counts	L	na	High calibration point for all calibrated scale

ce0122	High Calibration Weight	D	na	bases. Weight is in calibration units.
First Point of Calibration for Non-Linearity				
ce0123	Mid Calibration Counts	L	na	Calibration point for non-linear scale bases
ce0124	Mid Calibration Weight	D	na	with 1, 2, or 3 points of non-linearity. Weight is in calibration units.
ce0125	Calibration Gravity "Geo" Code	By	na	Value 0 – 31. This value represents the gravitational acceleration depending on the latitude and altitude of the specific location where you last calibrated the IND256x. The IND256x uses it to adjust the calculated weight value when you calibrate the IND256x in one location and operate it in a different region of the world. Any value other than 0-31 disables this feature.
ce0126	Motion Stability Sensitivity	US	na	Sensitivity in divisions, the value is ten times of division
ce0127	Motion Stability Time Period	US	na	Time in tenths of seconds
ce0129	Calibration Counter 1	By	na	Certifies current calibration of scale
ce0130	Calibration Counter 2	By	na	
ce0132	Over Capacity Divisions	By	na	Refer to ce–34
ce0133	# of upscale test points	By	na	1, 2, 3, or 4. Typically, there is only one upscale calibration point. For non-linear scale bases, two additional calibration points can help correct for the non-linearity. You may also use these additional "non-linearity" points to see more weight resolution in the higher ranges of a multi-ranging scale.
ce0134	Over Capacity Blanking	Bl	na	0 = no, 1 = yes. Blank the scale display when weight exceeds the capacity of the scale plus the over capacity divisions.
ce0137	Last Calibration Date & Time	AL2	na	In 1second intervals since 1970
ce0138	Base Serial Number	Aby14	na	Serial Number of Scale Base
Second Point of Calibration for Non-Linearity				
ce0139	Low Calibration Counts	L	na	Additional Calibration point for non-linear
ce0140	Low Calibration Weight	D	na	scale bases with 2 or 3 points of non-linearity. Weight is in calibration units.
Calculated Calibration Parameters				
ce0141	Use Calculated Calibration	Bl	na	0 = no, 1 = yes
ce0142	Load Cell Capacity	D	na	Load Cell Sensor Capacity, e.g., 5000 kg
ce0143	Load Cell Capacity Units	By	na	1 = pounds, 2 = kilograms, 3 = grams, 4 = metric tons, 5 = tons
ce0144	Rated Load Cell Output	D	na	Sensor output at the rated capacity, e.g., 2.0 Mv/V

ce0145	Gain Jumper	By	na	2 = default 2mv/V, 3 = 3Mv/V
ce0146	Estimated Preload	D	na	Estimated preload is optional. If entered,the system can check for saturation of the A/D input.
ce0147	Estimated Preload Units	By	na	1 = pounds, 2 = kilograms, 3 = grams, 4 = metric tons, 5 = tons
Third Point of Calibration for Non-Linearity				
ce0150	Xlow Calibration Counts	L	na	Additional Calibration point for non-linear
ce0151	Xlow Calibration Weight	D	na	scale bases with 3 points of non-linearity. Weight is in calibration units.
ce0199	EEPROM Block Checksum	US	na	

Methods

Motion/Stability is a measure of whether the weight has settled on the scale. Metrology regulations generally prohibit a weighing system from recording a measurement before the system has settled. The RST uses the Scale Motion/Stability status as an interlock for triggering a Pushbutton Tare command or for triggering a Print command. The IND256x examines the weight readings over a period of time to determine Motion/Stability of a scale. The weight readings over a chosen interval of time T must not differ from one another by more than the tolerance value V. The Service Technician can set the level for motion detection.

Over-Capacity Divisions are the number of display increments beyond the nominal scale capacity that the scale will operate. When the weight display exceeds the Over-Capacity Divisions, the weight display shows only an error display, the Over-Capacity logical status output is TRUE, and IND256x indicates that the weight transmitted is invalid. The Service Technician cannot disable the Over-Capacity checking.

The **Units of Measure** that the IND256x fully supports are:

- MKS – metric tons (t), kilograms (kg), grams (g)
- Avoirdupois – tons (ton), pounds (lb)
- troy ounces (toz), pennyweights (dwt), ounces (oz), custom units as secondary units only

The IND256x uses these fully supported units, as follows:

- Calibration Units define the units of calibration test weights.
- Primary Units are the preferred units of measure.
- Secondary Units are the alternate units when using units switching function. The IND256x can also display the Secondary units on the main display

With **Multiple Range** weighing, there can be up to three weighing ranges and each has a threshold. Each weighing range extends from zero to its range threshold. Each range has an associated increment size. The increment size and threshold value are larger for each successive weighing range from the lowest to highest ranges. The difference between the largest and smallest increment size is at most one decimal place. You manually set the increment sizes and thresholds in setup,

Capacity and increment setup guide

1. The maximum capacity can be acceptable is 1000000.
2. The increment can be acceptable is from 0.00001 to 500.0.
3. Each range division can be acceptable is form 100d to 100000d
4. The increment size and threshold value are larger for each successive weighing range from the lowest to highest ranges.
5. The difference between the largest and smallest increment size is at most one decimal place. This one is according to the IND256x application interface

The IND256x only supports automatic selection of the "current weighing range". When weight is increasing, the current weighing range proceeds from the lower range to the next higher range once the weight exceeds the range threshold. Switchover to the next higher range occurs at the range threshold. When weight is decreasing, the current weighing range returns from the current weighing range to the lowest range only when the weight falls within half-a-division of zero.

The IND256x weight display must clearly indicate the current weighing range. The terminal indicates weighing ranges 1, 2, and 3 respectively. The terminal maintains the same decimal point position in the Displayed Weight even when the current weighing range changes. There is at most one trailing, non-significant "0". When right of the decimal point, the non-significant "0" must be in the third place to the right of the decimal point. You may take a Tare in any weighing range. The Displayed Weight and Printed Weight are always the same.

In Gross Mode, the IND256x determines the current weighing range by comparing the Fine Gross Weight to the range thresholds. If scale is within half-a-division of zero, the terminal returns to the lowest weighing range as the current weighing range. The IND256x calculates the Displayed Gross Weight by rounding the Fine Gross Weight to the nearest weight increment for the current weighing range.

In Net Mode, the terminal determines current weighing range by comparing the Fine Gross Weight to the range thresholds. If the scale is within half-a-division of zero for gross mode: the terminal returns to the lowest weighing range as the current weighing range. The IND256x terminal calculates the Displayed Net Weight by rounding the Fine Net Weight to the nearest weight increment for the current weighing range. The IND256x calculates the Displayed Tare Weight by rounding the Fine Tare Weight to the nearest weight increment for the current weighing range. Displayed Gross Weight = Displayed Tare Weight + Displayed Net Weight

Multi-Interval weighing rules only apply when the scale base is a high precision base. There can be up to three weighing intervals. Each weighing interval has a threshold. Each weighing interval extends from the threshold of the next lower interval to its threshold. Each interval has an associated increment size. The increment size and threshold value are larger for each successive weighing interval from the lowest to highest intervals. The high precision base sets the increment sizes and thresholds. The terminal only supports automatic selection of the "current weighing interval". The IND256x display must clearly display the current weighing range. Displayed Weight and Printed Weight are always the same.

In Gross Mode, the IND256x determines the current weighing interval by comparing the Fine Gross Weight to the interval thresholds. The terminal calculates the Displayed Gross Weight by rounding the Fine Gross Weight to the nearest weight increment for the current weighing interval.

In Net Mode, the IND256x determines the "net weight current weighing interval" by comparing the Fine Net Weight to the interval thresholds. It calculates the Displayed Net Weight by rounding the Fine Net Weight to the nearest weight increment for the "net weight current weighing interval". The terminal determines the "tare weight current weighing interval" by comparing the Fine Tare Weight to the interval thresholds. It calculates the Displayed Tare Weight by rounding the Fine Net Weight to the nearest weight increment for the "tare weight current weighing interval". Displayed Gross Weight = Displayed Tare Weight + Displayed Net Weight.

Weights & Measures Compliance

Automatic Multi-Ranging is not compliant with the U.S. and Canadian regulations for Legal for Trade operation.

Calibration

The IND256x supports seven modes of scale calibration. These are:

1. Standard, Two-Point Linear Calibration is the standard mode for calibrating the large majority of scales. You measure the scale counts at the zero weight and at a span weight of the scale.
2. Three Point Calibration enables calibration of a scale with one intermediate point of non-linearity.
3. Four Point Calibration enables calibration of a scale with two intermediate points of scale non-linearity.
4. Five Point Calibration enables calibration of a scale with three intermediate points of scale non-linearity.
5. Calculated Calibartion measures to zero weight of the scale and calculates the span value of the scale based on the weighing parameters of the load cell and the analog A-to-D circuitry.
6. Zero Adjust Calibration adjusts only the zero value of the scale. It is valid for use with all modes of calibration.
7. Span Adjust Calibration adjusts only the span value of the scale in a standard, two-point linear calibration.

Calculated Calibration for Analog Load Cell Weighing Systems

Calibration using test weights is difficult or even impossible for large tank or hopper scales used in process weighing applications. Establishing a zero balance is easy, but it is frequently difficult to place a significant amount of calibrated test load on the scale. Service technicians routinely calibrate such scales in the field with test loads of less than 5% of scale capacity. Then, they use a "step test" using water or some other cheap material as a rough check of linearity performance. This type of span calibration is often less accurate than a mathematically calculated field calibration. When service technicians cannot apply test weights to a tank scale, they must use calculated field calibration as the only recourse.

Method

Calculated calibration requires that both the sensor(s) and the A/D converter be independently calibrated and their output gains known. As an added benefit, if the factory calibrates both the A/D converter and sensors with sufficient accuracy, service technicians can replace either device in the field with another device of the same type without performing a new field calibration.

The factory must calibrate the A/D converter to a common and known gain and offset for all devices of its type. The factory calibrates all IND256x Terminal A/D converters at two points:

Load Cell Input	Terminal Output
0 Mv/V	0 counts
2 Mv/V	1,000,000 counts

After factory calibration, all such devices have an A/D gain = 500,000 counts / Mv/V. The factory must calibrate the A/D converter for each jumper setting of 2 mv/V and 3 mv/V. Refer to "bc" block definition.

The second requirement is that the factory calibrates the sensor device(s) and publishes the output gain. We express the load cell sensor gain as electrical output in Mv/V at the rated mechanical input, typically in units of mass in pounds or kilograms. When you mount multiple identical load cells mechanically in parallel, the total sensor gain is the same as the gain for any one cell. This is typical for most multi-cell scales.

Example: The customer constructs a hopper scale using three load cells, each rated at 2 Mv/V output, 10,000 lb capacity. The service technical usually trims the load cells for zero output balance at no load, so:

Sensor gain = electrical output / mechanical input = (0.0002 Mv/V) / lb

Finally, the service technician must know the desired system capacity and units of measure.

Example: The desired system capacity is 5,000 kg.

System gain = (A/D gain) x (Sensor gain) x (Units Conversion)
= 500,000 counts/Mv/V x 0.0002 Mv/V/lb x 2.20462 lb/kg
= 220.462 counts/kg

While performing this computation, also the IND256x can also check for A/D saturation at full capacity. In order to perform this test, the service technician must provide the excitation voltage and an estimated preload weight. In actual operation, the weighing indicator replaces the estimated preload with an accurate field zero adjustment.

The IND256x excitation voltage is 10V. Assume that the hopper preload is 4500 kg. Very large preloads are common in process weighing.

Full output = (preload + capacity) x (Sensor gain) x (Units Conversion) x (excitation voltage)
= 9,500 kg x 2.20462 lb/kg x 0.0002 Mv/V/lb x 10V
= 41.9 Mv

IND256x will accept ~21 Mv before saturation. This scale will not work properly for loads above 10% capacity!

Shortcomings and Warnings

In some cases computed calibration is ineffective or can operate in undesired ways:

1. If the A/D converter provides multiple field selectable gain settings, such as a jumper to select 2Mv/V or 3 Mv/V load cells, the service technician must know the actual field gain selection.

The weighing indicator must account for the differences in the calculations. Further, since such gain adjustment is not perfect, the factory must calibrate the A/D converter for each setting.

2. Some junction boxes include potentiometers in each load cell's excitation or output wiring to allow field adjustment for corner errors. Since these resisters destroy all hope for accurate computed calibration, the service technician must disable them. There is little point to corner shift adjustment capability if the service technician cannot place test loads on the scale.
3. A barrier device placed in the load cell wiring will usually cause severe gain and offset changes. For example, this often occurs when the load receiver is in a hazardous area. If the barrier is well characterized, we can include these factors in the calculations. However, since this is almost never the case, we must revert to revert to field calibration with test loads.
4. Since A/D factory calibration is numeric only, results are highly accurate and repeatable. System accuracy remains virtually unaffected when swapping like A/D devices in the field without field calibration. Load cell calibration is analog in nature and difficult to perform with perfect accuracy. Maintaining system accuracy is correspondingly less certain when the service technician replaces a load cell. You must consult the vendor specifications for load cell trim to determine the system accuracy impact.

The IND256x protects the Calibration Settings when the Weights and Measures seal is in place.

The maximum capacity can be acceptable is 2000000.

1. The increment can be acceptable is from 0.00001 to 500.0.
2. Each range division can be acceptable is form 100d to 100000d
3. The increment size and threshold value are larger for each successive weighing range from the lowest to highest ranges.
4. The difference between the largest and smallest increment size is at most one decimal place. This one is according to the IND256x application interface.

3.4.2. Scale Zero Setup (ZR)

Access: "Service" default level is customizable by individual field.

Class Code: zr

Instances: 1

Attributes:

zr0100	Composite zr block	Struct	na	Composite of entire block
zr0101	Power-Up Zero Capture Pos Range	By	na	percent of capacity (0-99)
zr0102	Power-Up Zero Capture Neg Range	By	na	percent of capacity (0-99)
zr0103	Pushbutton Zero Positive Range	By	na	percent of capacity (0-99)
zr0104	Pushbutton Zero Negative Range	By	na	percent of capacity (0-99)
zr0105	Auto-Zero Maintenance Window	US	na	number of divisions
zr0106	Under-Zero Divisions	By	na	0-99 divisions. Number of divisions at which the under-zero indication is turned on the the display.

				"99" disables the under-zero display.
zr0107	Pushbutton Zero	By	na	0 = disabled, 1 = enabled
zr0108	Auto-Zero in Gross Mode	By	na	0 = disabled, 1 = enabled
zr0109	Auto-Zero in Gross & Net Mode	By	na	0 = disabled, 1 = enabled
zr0110	Zero-Indication in Gross Mode	By	na	0 = disabled, 1 = enabled
zr0111	Zero-Indication in Gross&Net Mode	By	na	0 = disabled, 1 = enabled
zr0112	Reset to Calibrated 0 on Power-Up	BI	na	0 = restart with current zero, 1 = reset to calibrated zero
zr0199	EEPROM Block Checksum		US	na

Methods

Zero is the interval between –0.5d and +0.5d, where "d" is a division or display increment. **Center of Zero** is the interval between –0.25d and +0.25d in most market regions. In Canada, Center of Zero is the interval between -0.20d and +0.20d. Center of Zero is a Boolean system output, TRUE when the display reading is in the center of zero range. IND256x evaluates Center of Zero at each new weight update. Metrology regulations usually require that the scale must show a Center of Zero status indication to the user at the primary weight display. Some jurisdictions require that the indication be present only while in gross weight mode, others require it in both gross and net mode.

When the service technician calibrates the scale, the IND256x records the Calibrated Zero reading internally. The IND256x also maintains a separate Current Zero reading that compensates for conditions that may change the scale so that it no longer indicates zero when the platform is empty. Such conditions include thermal effects and the accumulation of matter on the scale. The Center of Zero output is an indication of the quality of the Current Zero. There are several Methods available to establish a new Current Zero reading. In each case, there are limits applied to the acceptance of this command by the scale.

On system power up, the IND256x automatically attempts to establish a new Current Zero. The Power-up- Zero logic establishes a Current Zero when the present scale reading is stable and falls within the allowed tolerance from Calibrated Zero. This Power-up-Zero tolerance is the percentage of the scale capacity, specified for (+) and (–) tolerance limits. The service technician can disable Power-up-Zero.

Either the operator or a remote device can also attempt a Pushbutton Zero command. This command succeeds if the scale reading is stable and falls within its allowed tolerance from the Calibrated Zero. The Pushbutton Zero tolerance limits are a percentage of scale capacity, specified for (+) and (–) tolerance limits. The service technician can disable Pushbutton Zero.

The IND256x also provides **Automatic Zero Maintenance** or AZM. Within the AZM operating range, the IND256x makes small adjustments to the Current Zero reading to drive the weight reading toward true numeric zero. This feature operates only within a small range around true zero. The AZM moves toward zero at a rate of correction (correction amount per unit time) of 0.07 increments per second. "zr–05" configures the operating range of this feature in number of scale increments. Setting "zr–05" to 0 disables Automatic Zero Maintenance.

Under-Zero Divisions are the maximum number of display increments below zero that the scale will operate. When the weight falls below the Under-Zero Divisions, the weight display shows only an error display, the Under Zero logical status output is TRUE, and IND256x indicates that the weight transmitted is invalid. Setting the Under-Zero Divisions to 99 disables the under-zero check.

The IND256x protects the Zero Configuration Settings when the Weights and Measures seal is in place.

3.4.3. Option Board ID & Calibration EEPROM (BC)

Access: "Read Only" access level is not customizable.

Class Code: bc

Instances: 1

Always to be 05

Attributes:

Bc0100	Composite bc block	Struct	na	Composite of entire block
Bc0101	Calibration Data Length	US	na	A length ! = 0 indicates factory has programmed calibration data in the EEPROM. The factory must also set a valid checksum.
Bc0102	Board Serial Number	S14	na	Serial #'s are 13 digits + null terminator
bc0103	Board Part Number	S14	na	Part #'s are 13 digits + null terminator
bc0104	Board Serial & Part Checksum	US	na	for(i = sum = 0;i< len ; sum+ = ((char *)start)[i++]); Analog Board Calibration Fields Required Are Only Set for Analog Boards
Bc0105	Zero Counts with 2mv/V jumper	UL	na	A/D Counts at 0mv/V input w 2mv/V jumper
bc0106	Span Counts with 2mv/V jumper	UL	na	A/D Counts at 2mv/V input w 2mv/V jumper
bc0107	Zero Counts with 3 mv/V jumper	UL	na	A/D Counts at 0mv/V input w 3mv/V jumper
bc0108	Span Counts with 3 mv/V jumper	UL	na	A/D Counts at 2mv/V input w 3mv/V jumper
bc0109	Targeted Output Counts In Span	UL	na	Targeted output counts in span calibration
bc0110	Reduced Excitation Version	US	na	1 = Yes; 0 = No
bc0199	BC block check sum	US	na	

METTLER TOLEDO Service

To protect your product's future:

Congratulations on choosing the quality and precision of METTLER TOLEDO. Proper use according to these instructions and regular calibration and maintenance by our factory-trained service team ensure dependable and accurate operation, protecting your investment. Contact us about a service agreement tailored to your needs and budget.

We invite you to register your product at www.mt.com/productregistration so we can contact you about enhancements, updates and important notifications concerning your product.

www.mt.com
For more information

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