

# COM-570 Application Software



METTLER TOLEDO



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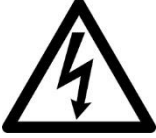



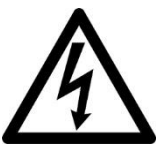

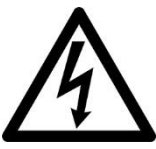


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# 1 Introduction

The COM-570 option is a specialized solution focused on the needs of those using legacy communication protocols, or with special command requirements. When this special application is provided in the IND570 terminal, it is referred to as an IND570com terminal.

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[www.mt.com/IND570](http://www.mt.com/IND570)



[www.mt.com/IND570xx](http://www.mt.com/IND570xx)



## 1.1. Specifications

The IND570com has the same physical and electrical capabilities as the standard IND570. The firmware is enabled through the use of an “application hardware key.” This is an electrical device that is inserted into a receptacle on the IND570 main board. It contains a code that enables access to the features and capabilities of the COM-570 software.

Table 1-1 details specifications of the IND570com, over and above the basic functionality of the IND570.

**Table 1-1: IND570com Specifications**

Function	Features and Options
Templates	<ul style="list-style-type: none"><li>• Command</li></ul>
Communication Connections	<ul style="list-style-type: none"><li>• 8142 Host Protocol</li><li>• 8530 Host Protocol</li><li>• PT6S3 Protocol</li><li>• SMA (Scale Manufacturers Association) scale communication protocol</li><li>• METTLER TOLEDO Continuous Short</li></ul>

## 1.2. Basic Terminal Functionality

The Basic Functionality capabilities of the IND570 are accessible when using the IND570com. Functions such as printing with templates, TraxDSP filtering, TraxEMT maintenance, diagnostic and logging capabilities and support for analog or IDNet scale bases are accessible through the IND570com. Please consult the **IND570 User's Guide** for a full list of those capabilities and how to configure them.

## 1.3. COM-570 Capabilities

Each of the following functions is described in detail in later Appendixes. The IND570com may be configured to enable any one of these functions in Setup at **Communications > Connections**.

### 1.3.1. 8142 Host Mode

This mode is primarily used in METTLER TOLEDO legacy industrial terminals such as the 8142 and LYNX®. Host computers can use this protocol to read or write specific scale and terminal data using designated Hex or ASCII function codes. For example, the remote host computer could read a specific scale's displayed, gross, tare or net weight from the terminal and it could write to the scale's active target value or next sequential number. Access to status and control bytes allows the host computer to monitor and control the operation of a specific scale.

The 8142 protocol is suitable for either single or multiple scale applications. By assigning each local scale in the terminal with a unique node address, the host device can get access to any specific scale using one of the available types of serial interface (RS-232, RS-422 or RS-485). Additionally, when the RS-485 interface is used, several terminals can be connected to a single host device in a multi-drop network. The maximum number of scales or address nodes in the network is 8.

### 1.3.2. 8530 Host Mode

This mode is primarily used in METTLER TOLEDO legacy industrial terminals such as the 8530, COUGAR™ and LYNX®. With this protocol, host computers can read or write specific scale and terminal data using designated Hex or ASCII function codes. For example, the remote host computer could read a specific scale's displayed, gross, tare or net weight from the terminal and it could write to the scale's active target value or next sequential number. Access to status and control bytes allows the host computer to monitor and control the operation of a specific scale.

The 8530 protocol is suitable for either single or multiple scale applications. By assigning a unique node address to each local scale in the terminal, the host device can get access to any specific scale using one of the available types of serial interface (RS-232, RS-422 or RS-485). Additionally, when the RS-485 interface is used, several terminals can be connected to a single host device in a multi-drop network. The maximum number of scales or address nodes in the network is 8.

### 1.3.3. PT6S3 Protocol

PT6S3 is a single scale host protocol that also includes the commands of its predecessors (notably PT6S2, the most common) in order to maintain full compatibility of the functions. This protocol allows the replacement of an old model indicator in an existing installation. The host device

typically issues an individual ASCII character command to retrieve certain scale data such as the displayed weight or the scale capacity from the IND570com. Tare, clear tare, zero and print functions are also supported.

#### **1.3.4. SMA Protocol**

The Scale Manufacturers Association (SMA) has defined a Scale Serial Communication Protocol standard in order to facilitate a common communications architecture for weighing scale instruments across all scale vendors and manufacturers. The protocol is based on a Command/Response method where the commanding host device is responsible for issuing specific ASCII character commands to request certain scale data or to perform a terminal function.

The IND570com terminal running the SMA protocol allows the host device access to a single scale through an available communications port that has been assigned to this function. The protocol is available on COM1 through COM3 with any type of interface (RS-232, RS-422 or RS-485).

# 2 Operation

This chapter provides information about general operation of the IND570com terminal. It is assumed that the user of this manual has reviewed and understands the operation of the standard IND570.

Operation of the terminal depends on enabled functions and setup parameters. Functionality and configuration parameters are programmed in Setup and can be modified as necessary by users with appropriate access levels.

## 2.1. Security

The IND570com supports multiple users and passwords for setup security. The terminal is configured at the factory with two user names – “admin” and “anonymous.” The factory default passwords are null (no password), so the factory configured unit requires no login or password entry to access the setup mode. Apart from adding or modifying a password, the “admin” user cannot be changed.

Remember the password. If it is changed or forgotten, access to the setup menu will not be available. Be sure to protect the password from unauthorized personnel. The password provides access to the entire setup menu, unless the metrology switch is placed in the approved position, in which case access to scale setup and other metrologically significant areas is not permitted. Please refer to Chapter 2, **Operation**, in the **IND570 User's Guide** for additional information concerning the use of Security and the multiple classes of users available with the IND570 terminal.

## 2.2. Initial Installation

For hardware key installation, refer to the guide provided with the COM-570 module.

## 2.3. Display Messages

If, on power-up, the terminal finds that the hardware application key status has changed, a fault message (Figure 2-1) will display. For instance, if the COM-570 hardware key was added to a standard unit, the fault would be displayed at power up.



**Figure 2-1: Application Key Fault Message**

Even though the ENTER graphic is shown, the ENTER key does not function. Two responses to this error are possible:

- If the hardware key status was **not** changed on purpose, turn power off and determine what caused the status to change. Fix the problem and apply power again. The terminal will retest the hardware key status.
  - If the hardware key status **was** changed on purpose by adding or removing a key, perform a manual Master Reset – refer to **Master Reset** under Troubleshooting, in Chapter 5, **Service and Maintenance**, in the **IND570 User's Guide**.
- Note: Back up the terminal's current setup parameters before the hardware key status is changed. The original setup can then be downloaded to the terminal after the Master Reset has been performed.


# 3 Configuration


This Chapter covers:

- Entering Setup Mode
- Exiting Setup Mode
- Setup Menu Tree
- Overview of Configuration
- Configuration of the COM-570

This chapter provides information about how to configure the IND570 terminal's operating system with COM-570 functionality. It describes access to the setup mode, where functions can be enabled, disabled, or defined by entering parameter values in specific setup screens.

## 3.1. Entering Setup Mode

The configuration of the IND570com terminal is accessed through the SETUP softkey . If security has not been enabled, pressing the SETUP softkey will provide direct access to the setup menu tree. If password security has been enabled, a login screen displays and the user must enter the correct password in order to advance into setup. (For further information about password setup and security, refer to the **Security** section in Chapter 2, **Operation**, in the standard **IND570 User's Guide**.)


When the login screen is shown, pressing the ESCAPE softkey  exits to the home screen without entering any login information.

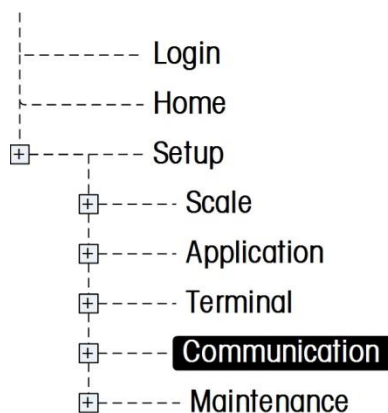
## 3.2. Exiting Setup Mode

To exit the setup mode, select Home from the setup menu tree and press ENTER. The default weighing operation screen displays.

- As an alternative, press the first softkey at any time the menu tree is displayed to exit the setup.

## 3.3. Setup Menu Tree

When the SETUP softkey , is pressed, the IND570com menu tree will be displayed. The menu tree of the IND570com is similar to the standard IND570. Unlike other application software available for the IND570, the COM-570 functions are not located under a new, single branch. The functions associated with COM-570 are found under the Communication branch. Figure 3-1 shows the main branches of the menu tree, with focus on Communication.



**Figure 3-1: Fully Collapsed Menu Tree**

Navigation in the menu tree is the same as the standard IND570 terminal:

- Use the UP and DOWN navigation keys to move focus through the branches of the setup menu tree.
- Press the RIGHT navigation key to expand a branch and the LEFT navigation key to collapse a branch. When the focus is on a sub-branch, focus can quickly be moved back to the main branch by pressing the LEFT navigation key.
- When a leaf node (singular, non-expandable) branch such as Device or Display is in focus, press the ENTER key to display the setup screen for that function.

## 3.4. Overview of Configuration

The setup menu tree can be expanded to show every branch and leaf node in the terminal's configuration. Use the navigation keys to select the desired setup screen.

The five major branches in the setup menu tree (shown in green in Figure 3-2: ) are:

- Scale
- Application
- Terminal
- Communication
- Maintenance

Existing branches with new parameters for the COM-570 functionality are shown in red in Figure 3-2.



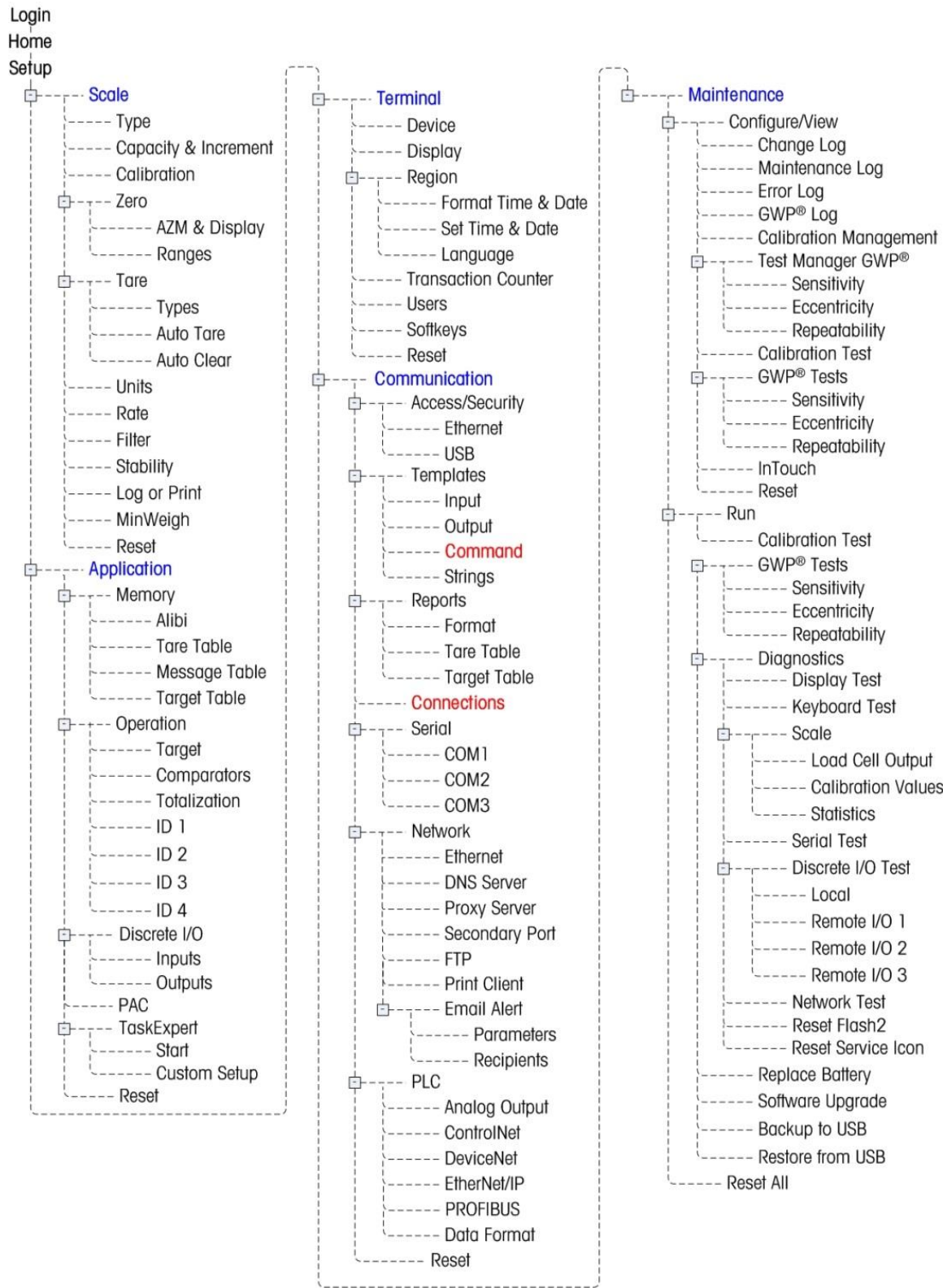


Figure 3-2: The IND570com Menu Tree

## 3.5. Configuring Setup

IND570com terminal options are configured on the setup screens available under the **Scale**, **Application**, **Terminal**, **Communication** and **Maintenance** branches of the setup menu. Only the **Communication** branch is modified by the COM-570 software.

- Note: If the metrology switch is in the approved position (SW1-1 = ON), access to the Scale branch is not permitted. The Scale branch will not be expandable on the setup menu tree.

## 3.6. Scale

The IND570com adds no new setup parameters or selections to the Scale branch. Refer to the **IND570 User's Guide** for setup information.

## 3.7. Application

The IND570com adds no new setup parameters or selections in the Application branch. Refer to the **IND570 User's Guide** for setup information.

## 3.8. Terminal

The IND570com adds no new setup parameters or selections in the Terminal branch. Refer to the **IND570 User's Guide** for setup information.

## 3.9. Communication

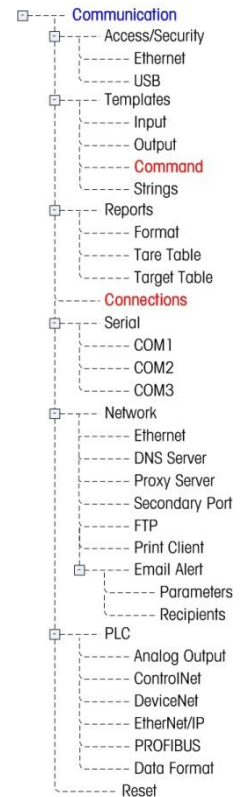
Setup screens for Communication setup include:

Access/Security	Templates	Reports	Connections
Serial	Network	PLC	

Use these setup screens to configure:

- Secure access to parameters
- Input, Output, Command Template Setup
- Report Structure
- Connection Assignments
- Serial Port Parameters
- Network Parameters, including Email Alert settings
- PLC Interfaces

All the new features and functions of the COM-570 are found under this branch of the Setup menu tree. There is a new selection under Templates, and several new assignments available in Connections. Refer to Chapter 3, **Configuration**, in the **IND570 User's Guide** for details on all other setup information for the Communication branch of setup.



### 3.9.1. Templates

A new template, Command, allows a user to customize CPTZ type commands being sent to the IND570com.

#### 3.9.1.1. Command

The Command Templates screen sets the format of ASCII control commands sent to the terminal. These commands trigger the following functions in the terminal:

- |         |                             |
|---------|-----------------------------|
| • Clear | • Switch Units              |
| • Tare  | • Switch to Primary Units   |
| • Print | • Switch to Secondary Units |
| • Zero  | • Preset Tare               |

To duplicate a previous protocol, one or two prefix and one or two suffix characters can be enabled for all the commands in the Command Template setup screen. If enabled, prefix characters must be sent before any valid command. Suffix characters, if enabled, must be sent to complete a command.

3.9.1.1.1. Prefix and Suffix Characters

The following characters may be assigned as prefixes and suffixes:

None*	SOH	STX	ETX	EOT	ENQ	ACK	BEL
BS	HT	LF	VT	FF	CR	SO	SI
DLE	DC1	DC2	DC3	DC4	NAK	SYN	ETB
CAN	EM	SUB	ESC	FS	GS	RS	US


\* If None is selected, the prefix or suffix is disabled.

■ Refer to Appendix C for ASCII control character definitions and functions

3.9.1.1.2. Command Template Editing


Prefixes and suffixes may be configured for the following commands:

Command	Default Data
Clear	C
Tare	T
Print	P
Zero	Z
Switch Units	U
Primary Unit	U1
Second Unit	U2
Preset Tare	123456

Commands can be edited by accessing the Command Templates view screen (Figure 3-3) from the Command Templates setup screen (Figure 3-4). The editing screen for each command is accessed by selecting the desired command and pressing the Edit softkey .



**Figure 3-3: Command Templates View Screen**

The Edit Command Template screen gives the name of each command, and includes a data field in which the default value shown above appears. Figure 3-4 shows the screen used to format the Clear command. The Delete softkey  deletes the data field for the selected command.



**Figure 3-4: Edit Command Template Screen**

The Preset Tare command should be formatted with a fixed text block indicating where the tare value is located in the input string. The tare value can be programmed to occur either before or after the Tare character.

For example, if the first command text block is an "MQ", 123456 is entered into the next fixed text block, and the last text block contains a TR, then the command will be MQ123456TR, and the terminal will interpret the Preset Value as the digits between the MQ character sequence and the TR character sequence in the ASCII input string. Figure 3-5 shows a view of the Tare Command Formatting screen.



**Figure 3-5: Preset Tare Command Formatting Example**

- Note: The available resolution of the Preset Tare Value matches that of the IND570. The "123456" in this example is simply a generic number. The maximum resolution of a Preset Tare Value is 7 digits.

### 3.9.2. Connections



The COM-570 module adds new connection assignments that can be used to communicate with systems currently installed at customer locations.

The connections setup screen shows the physical port connections that have been programmed for the terminal. This includes the standard serial port COM1, optional COM2 and COM3 serial ports, and the optional Ethernet1, Ethernet2 and Ethernet3 ports. The optional ports are only available if the Ethernet option board has been installed. If no connections are programmed, nothing will be available on the COM ports or Ethernet ports.

The following functions are available via soffkeys on the connections screen:

- Editing
- Deleting
- Clearing
- Inserting

**3.9.2.1. To edit or insert connection assignments**

1. Press the UP and DOWN navigation keys to select (highlight) a connection assignment in the list.
2. Press the EDIT softkey  to open the setup screen for editing a specific connection assignment or press the INSERT softkey  to create a new connection assignment.

Parameters that are configured in the connections screen include the port and the type of input or output assignment. Depending upon these selections the remaining fields will vary but could include the trigger, the template to be sent, and if checksum will be sent or not.

3. Press the UP and DOWN navigation keys to move the focus to the fields to be edited or added.
4. Press the ENTER key to select a field to edit or add.
5. Use the selection boxes for each field to select the port, associated assignment, and desired settings for the connection. New choices added with the IND570com are:
  - 8142 Host
  - MT Continuous Short
  - SMA Protocol
  - 8530 Host
  - PT6S3 Protocol






Table 3-1 shows the options available for each combination of port and assignment.

**Table 3-1: Configuration Options by Port and Assignment**

Port	Assignment	Trigger	Template	# of Nodes	Checksum	Address
COM1 COM2 COM3	8142 Host	n/a	n/a	n/a	Disabled, Enabled	2 - 9
	8530 Host	n/a	n/a	n/a	Disabled, Enabled	2 - 9
	Command Template	n/a	n/a	n/a	n/a	n/a
	Continuous Short	n/a	n/a	n/a	Disabled, Enabled	n/a
	PT6S3	n/a	n/a	n/a	n/a	n/a
	SMA	n/a	n/a	n/a	n/a	n/a

**3.9.2.2. Connection options notes**

- Only COM-570 relevant ports and assignments are shown in the table above.
- If conflicts in use occur, an alarm message displays.

1. Press the OK softkey  to accept the connection parameters and return to the Connections setup screen when editing or adding the connection assignment is complete.
2. Press the ESCAPE softkey  to discard the connection parameters and return to the Connections setup screen without saving the connection assignment edits or additions.  
 Press the DELETE softkey  to delete a connection assignment from the Connections list.  
 Press the CLEAR softkey  to clear all connection assignments in the Connections list.  
 Press the EXIT softkey  to return to the menu tree.

Refer to **Appendices D, E, F, and G** of this manual for specifications for the 8142 Host, 8530 Host, PT6S3 and SMA legacy communication protocols, as well as specifications for the Mettler Toledo Continuous Short data output.

## **3.10. Maintenance**

The IND570com adds no new setup parameters or selections in the Maintenance branch. Refer to the standard **IND570 User's Guide** for setup information.

# A Serial Communications

## A.1. Serial Interface Parameters

One standard and two optional serial ports are supported with the IND570 terminal. They are designated COM1 (standard port on the Main PCB), COM2 (optional), and COM3 (optional).

**COM1** provides RS-232, RS-422, and RS-485 interfaces. The RS-232 interface is a three-wire (TDX, RXD, and GND) with XON/XOFF flow-control capabilities (handshaking). This port can also be used for loading new IND570 firmware and to access the shared data server. The RS-422 interface is a four-wire interface designed. The RS-485 connection is a two-wire interface. All interfaces can be output simultaneously; however, only one input can be used.

The RS-422 and RS-485 interfaces of the IND570, when used in conjunction with the 8142 Host Protocol or 8530 Host Protocol, provide a master/satellite protocol to permit up to eight (8) IND570s to be connected in a daisy chain network to a single host device. At Communication > Connection, each IND570 can be assigned a unique scale address (2 through 9) to distinguish one IND570 from another. The RS-232 interface can be used to connect one IND570 to one computer using the same protocol as the multi-drop interface.

Optional **COM2** provides only RS-232. This interface is a three-wire connection with XON/XOFF handshaking capabilities.

Optional **COM3** provides RS-232, RS-422, and RS-485 interfaces. The RS-232 interface is a three-wire (TDX, RXD, and GND) with XON/XOFF flow-control capabilities (handshaking). The RS-422 interface is a four-wire interface. The RS-485 connection is a two-wire interface. All interfaces can be output simultaneously; however, only one input can be used.

The RS-422 and RS-485 interfaces of the IND570, when used in conjunction with the 8142 Host Protocol or 8530 Host Protocol, provide a master/satellite protocol to permit up to eight (8) IND570s to be connected in a daisy chain network to a single host device. At Communication > Connection, each IND570 can be assigned a unique scale address (2 through 9) to distinguish one IND570 from another. The RS-232 interface can be used to connect one IND570 to one computer using the same protocol as the multi-drop interface.

Character framing is programmable in the setup mode. Framing can be:

- 1 start bit
- 7 or 8 ASCII data bits (selectable)
- 0 or 1 parity bit (none, even, or odd)
- 1 stop bit



The baud rate can be configured from 300 to 115.2K baud and a checksum character can also be configured for the standard continuous output string.

The IND570 terminal uses software handshaking to control data flow commonly referred to as XON/XOFF handshaking. When a receiving device (typically a printer) is getting information from an IND570 terminal and cannot receive any more in its buffer, it sends an ASCII XOFF (13h) telling the IND570 terminal to temporarily stop sending data until its buffer clears.

When the device can receive more data, it sends an ASCII XON (11h) telling the IND570 terminal to begin sending data again. This process can occur as often as required by a receiving device.

The XON/XOFF method is the only type of handshaking that is supported by the IND570 terminal.

The IND570 terminal supports two different modes of data output – demand and continuous.

# B Default Settings

This appendix provides details of the default condition of all the IND570com setup parameters. Refer to Appendix A of the **IND570 User's Guide** for a full listing of all setup parameter default settings.

Setup Feature	Default Value	Security Access
<b>Communication—Template—Command</b>		
Prefix	None, None	Maintenance
Terminator	None, None	Maintenance
Clear	C	Maintenance
Tare	T	Maintenance
Print	P	Maintenance
Zero	Z	Maintenance
Switch Units	U	Maintenance
Primary Unit	U1	Maintenance
Second Unit	U2	Maintenance
Preset Tare	(blank), T	Maintenance
<b>Communication – Connections (one default connection preconfigured)</b>		
Port	COM1	Maintenance
Assignment	Demand	Maintenance
Trigger	Scale	Maintenance
Template	Template 1	Maintenance

# C ASCII Standard and Control Characters

## C.1. Standard Characters

Table C-1: ASCII Standard Characters

Char.	Dec.	Hex.	Binary 7654 3210	Char.	Dec.	Hex.	Binary 7654 3210	Char.	Dec.	Hex.	Binary 7654 3210
NUL	0	00	00000000	ETB	23	17	00010111	.	46	2E	00101110
SOH	1	01	00000001	CAN	24	18	00011000	/	47	2F	00101111
STX	2	02	00000010	EM	25	19	00011001	0	48	30	00110000
ETX	3	03	00000011	SUB	26	1A	00011010	1	49	31	00110001
EOT	4	04	00000100	ESC	27	1B	00011011	2	50	32	00110010
ENQ	5	05	00000101	FS	28	1C	00011100	3	51	33	00110011
ACK	6	06	00000110	GS	29	1D	00011101	4	52	34	00110100
BEL	7	07	00000111	RS	30	1E	00011110	5	53	35	00110101
BS	8	08	00001000	US	31	1F	00011111	6	54	36	00110110
HT	9	09	00001001	SP	32	20	00100000	7	55	37	00110111
LF	10	0A	00001010	!	33	21	00100001	8	56	38	00111000
VT	11	0B	00001011	"	34	22	00100010	9	57	39	00111001
FF	12	0C	00001100	#	35	23	00100011	:	58	3A	00111010
CR	13	0D	00001101	\$	36	24	00100100	;	59	3B	00111011
SO	14	0E	00001110	%	37	25	00100101	<	60	3C	00111100
SI	15	0F	00001111	&	38	26	00100110	=	61	3D	00111101
DLE	16	10	00010000	'	39	27	00100111	>	62	3E	00111110
DC1	17	11	00010001	(	40	28	00101000	?	63	3F	00111111
DC2	18	12	00010010	)	41	29	00101001	@	64	40	01000000
DC3	19	13	00010011	*	42	2A	00101010	A	65	41	01000001
DC4	20	14	00010100	+	43	2B	00101011	B	66	42	01000010
NAK	21	15	00010101	,	44	2C	00101100	C	67	43	01000011
SYN	22	16	00010110	-	45	2D	00101101	D	68	44	01000100

Char.	Dec.	Hex.	Binary 7654 3210
E	69	45	01000101
F	70	46	01000110
G	71	47	01000111
H	72	48	01001000
I	73	49	01001001
J	74	4A	01001010
K	75	4B	01001011
L	76	4C	01001100
M	77	4D	01001101
N	78	4E	01001110
O	79	4F	01001111
P	80	50	01010000
Q	81	51	01010001
R	82	52	01010010
S	83	53	01010011
T	84	54	01010100
U	85	55	01010101
V	86	56	01010110
W	87	57	01010111
X	88	58	01011000
Y	89	59	01011001
Z	90	5A	01011010
[	91	5B	01011011
\	92	5C	01011100
]	93	5D	01011101
^	94	5E	01011110
_	95	5F	01011111
`	96	60	01100000
a	97	61	01100001
b	98	62	01100010
c	99	63	01100011
d	100	64	01100100
e	101	65	01100101

Char.	Dec.	Hex.	Binary 7654 3210
f	102	66	01100110
g	103	67	01100111
h	104	68	01101000
i	105	69	01101001
j	106	6A	01101010
k	107	6B	01101011
l	108	6C	01101100
m	109	6D	01101101
n	110	6E	01101110
o	111	6F	01101111
p	112	70	01110000
q	113	71	01110001
r	114	72	01110010
s	115	73	01110011
t	116	74	01110100
u	117	75	01110101
v	118	76	01110110
w	119	77	01110111
x	120	78	01111000
y	121	79	01111001
z	122	7A	01111010
{	123	7B	01111011
	124	7C	01111100
}	125	7D	01111101
~	126	7E	01111110
	127	7F	01111111
Reserved	128	8A	
		to	to
	159	9F	
	160	A0	10100000
i	161	A1	10100001
ç	162	A2	10100010
£	163	A3	10100011
€	164	A4	10100100

Char.	Dec.	Hex.	Binary 7654 3210
¥	165	A5	10100101
Š	166	A6	10100110
§	167	A7	10100111
š	168	A8	10101000
©	169	A9	10101001
ª	170	AA	10101010
«	171	AB	10101011
¬	172	AC	10101100
	173	AD	10101101
®	174	AE	10101110
-	175	AF	10101111
°	176	B0	10110000
±	177	B1	10110001
²	178	B2	10110010
³	179	B3	10110011
Ž	180	B4	10110100
μ	181	B5	10110101
¶	182	B6	10110110
·	183	B7	10110111
ž	184	B8	10111000
ı	185	B9	10111001
º	186	BA	10111010
»	187	BB	10111011
Œ	188	BC	10111100
œ	189	BD	10111101
Ÿ	190	BE	10111110
ı	191	BF	10111111
À	192	C0	11000000
Á	193	C1	11000001
Â	194	C2	11000010
Ã	195	C3	11000011
Ä	196	C4	11000100
Å	197	C5	11000101
Æ	198	C6	11000110

Char.	Dec.	Hex.	Binary 7654 3210	Char.	Dec.	Hex.	Binary 7654 3210	Char.	Dec.	Hex.	Binary 7654 3210
Ç	199	C7	11000111	Ñ	209	D1	11010001	Û	219	DB	11011011
È	200	C8	11001000	Ò	210	D2	11010010	Ü	220	DC	11011100
É	201	C9	11001001	Ó	211	D3	11010011	Ý	221	DD	11011101
Ê	202	CA	11001010	Ô	212	D4	11010100	Þ	222	DE	11011110
Ë	203	CB	11001011	Õ	213	D5	11010101	ß	223	DF	11011111
Ì	204	CC	11001100	Ö	214	D6	11010110	à	224	E0	11100000
Í	205	CD	11001101	×	215	D7	11010111	â	226	E2	11100010
Î	206	CE	11001110	Ø	216	D8	11011000				
Ï	207	CF	11001111	Ù	217	D9	11011001				
Ð	208	DO	11010000	Ú	218	DA	11011010				

## C.2. Control Characters

Table C-2: ASCII Control Characters

Char	Definition	Function
SOH	START OF HEADING	A transmission control character used as the first character of a heading of an information message.
STX	START OF TEXT	A transmission control character that precedes a text and that is used to terminate a heading.
ETX	END OF TEXT	A transmission control character that terminates a text.
EOT	END OF TRANSMISSION	A transmission control character used to indicate the conclusion of the transmission of one or more texts.
ENQ	ENQUIRY	A transmission control character used as a request for a response from a remote station; the response may include station identification and/or station status. When a "Who are you" function is required on the general switched transmission network, the first use of ENQ after the connection is established will have the meaning "Who are you" (station identification). Subsequent use of ENQ may, or may not, include the function "Who are you", as determined by agreement.
ACK	ACKNOWLEDGE	A transmission control character transmitted by a receiver as an affirmative response to the sender.
BEL	BELL	A control character that is used when there is a need to call for attention; it may control alarm or attention devices.
BS	BACKSPACE	A format effector that moves the active position one character position backwards on the same line.

Char	Definition	Function
HT	HORIZONTAL TABULATION	A format effector that advances the active position to the next pre-determined character position on the same line.
LF	LINE FEED	A format effector that advances the active position to the same character position of the next line.
VT	VERTICAL TABULATION	A format effector that advances the active position to the same character position on the next pre-determined line.
FF	FORM FEED	A format effector that advances the active position to the same character position on a pre-determined line of the next form or page.
CR	CARRIAGE RETURN	A format effector that moves the active position to the first character position on the same line.
SO	SHIFT OUT	A control character that is used in conjunction with SHIFT IN and ESCAPE to extend the graphic character set of the code.
SI	SHIFT IN	A control character that is used in conjunction with SHIFT OUT and ESCAPE to extend the graphic character set of the code.
DLE	DATA LINK ESCAPE	A transmission control character that will change the meaning of a limited number of contiguously following characters. It is used exclusively to provide supplementary data transmission control functions. Only graphic characters and transmission control characters can be used in DLE sequences.
DC1	DEVICE CONTROL ONE	A device control character that is primarily intended for turning on or starting an ancillary device. If it is not required for this purpose, it may be used to restore a device to the basic mode of operation (see also DC2 and DC3), or for any other device control function not provided by other DCs.
DC2	DEVICE CONTROL TWO	A device control character that is primarily intended for turning on or starting an ancillary device. If it is not required for this purpose, it may be used to set a device to a special mode of operation (in which case DC1 is used to restore normal operation), or for any other device control function not provided by other DCs.
DC3	DEVICE CONTROL THREE	A device control character that is primarily intended for turning off or stopping an ancillary device. This function may be a secondary level stop, for example, wait, pause, stand-by or halt (in which case DC1 is used to restore normal operation). If it is not required for this purpose, it may be used for any other device control function not provided by other DCs.
DC4	DEVICE CONTROL FOUR	A device control character that is primarily intended for turning off, stopping, or interrupting an ancillary device. If it is not required for this purpose, it may be used for any other device control function not provided by other DCs.
NAK	NEGATIVE ACKNOWLEDGE	A transmission control character transmitted by a receiver as a negative response to the sender.

<b>Char</b>	<b>Definition</b>	<b>Function</b>
<b>SYN</b>	SYNCHRONOUS IDLE	A transmission control character used by a synchronous transmission system in the absence of any other character (idle condition) to provide a signal from which synchronism may be achieved or retained between data terminal equipment.
<b>ETB</b>	END OF TRANSMISSION BLOCK	A transmission control character used to indicate the end of a transmission block of data where data is divided into such blocks for transmission purposes.
<b>CAN</b>	CANCEL	A character, or the first character of a sequence, indicating that the data preceding it is in error. As a result, this data is to be ignored. The specific meaning of this character must be defined for each application and/or between sender and recipient.
<b>EM</b>	END OF MEDIUM	A control character that may be used to identify the physical end of a medium, or the end of the used portion of a medium, or the end of the wanted portion of data recorded on a medium. The position of this character does not necessarily correspond to the physical end of the medium.
<b>SUB</b>	SUBSTITUTE	A control character used in the place of a character that has been found to be invalid or in error. SUB is intended to be introduced by automatic means.
<b>ESC</b>	ESCAPE	A control character that is used to provide additional control functions. It alters the meaning of a limited number of contiguously following bit combinations.
<b>FS</b>	FILE SEPARATOR	A control character used to separate and qualify data logically; its specific meaning has to be specified for each application. If this character is used in hierarchical order, it delimits a data item called a file.
<b>GS</b>	GROUP SEPARATOR	A control character used to separate and qualify data logically; its specific meaning has to be specified for each application. If this character is used in hierarchical order, it delimits a data item called a group.
<b>RS</b>	RECORD SEPARATOR	A control character used to separate and qualify data logically; its specific meaning has to be specified for each application. If this character is used in hierarchical order, it delimits a data item called a record.
<b>US</b>	UNIT SEPARATOR	A control character used to separate and qualify data logically; its specific meaning has to be specified for each application. If this character is used in hierarchical order, it delimits a data item called a unit.

# D 8142 Host Protocol

## D.1. Overview

Two basic types of communication can occur between the host and the IND570com terminal:

**Upload** The host requests information from the IND570 terminal. The IND570 terminal responds to the request.

**Download** The host transmits new data to the IND570 terminal.

The IND570 commands differ from the 8142 because of the differences in functionality. The following are not supported in the IND570:

- Setup Bytes (J)
- Target (Setpoint) 2, 3, 4 (L)
- Zero Tolerance (M)
- #2 Target (Setpoint) (O)

■ **Note:** All 8142 commands previously referred to as Setpoint, Dribble and Preact, will now be listed at Target, Fine Feed and Spill, respectively, to match the commands currently used in the IND570.

## D.2. Data Packet Format

All transmissions by the host or the IND570 terminal port must be in the data packet format shown:

**Note:** Decimal points, weight units and descriptors are not included in data fields.

Port Data Packet Format							
Data	STX	ADR	DIR	FCT	Data Field	CR	CHK
Notes	1	2	3	4	5	6	7

### D.2.1. Table Notes

- 1 <STX> ASCII Start of Text Character, Hex 02.
- 2 <ADR> IND570 scale address selected in setup, must be from an ASCII 2 to 9.
- 3 <DIR> Data Direction, "U" = Upload (IND570 to Host), "D" = Download (Host to IND570).
- 4 <FCT> Function code, refer to Function Code Table.
- 5 <Data Field> The data field is either the uploaded data from the IND570 terminal or the downloaded data from the host. Not all function codes use the data field.
- 6 <CR> ASCII Carriage Return, Hex 0D.



- 7 <CKS> Optional Checksum Character, 2's complement of the 7 low order bits of the binary sum of all characters on a line, preceding the checksum.

## D.3. Host Port Function Codes

The function code in the data packet determines what operation or data is accessed in the IND570 terminal. The codes for the various functions are listed in the Function Code Table with the valid direction of the communication (upload or download) and the length of the transmitted data field.

The IND570 terminal ignores any command it does not understand. No error detection beyond checksum is provided for downloads by the port. When critical data such as Target data is downloaded from the host to the IND570 terminal, it is recommended that the host device upload (read back) the data downloaded to the IND570 terminal to verify that the data was received correctly.

Function Code Description	Function Code		Direction	Data Field Length
	Hex	ASCII		
All Functions	41	A	U	187
Displayed Weight	42	B	U	7
Gross Weight	43	C	U	7
Tare Weight	44	D	U/D	7
Net Weight	45	E	U	7
Time and Date	46	F	U/D	12
Next Transaction Number	47	G	U/D	6
Clear Last Printed Data from Memory	48	H	U/D	0
Status Bytes	49	I	U	6
Control Bytes	4B	K	D	3
Active Target	4C	L	U/D	24
Active Target, Fine Feed, Spill, Tolerance	4E	N	U/D	24
Terminal ID 1	50	P	U/D	6
Last Printed Data from Printer Port	51	Q	U	*
Sub-Total Accumulator	54	T	U	10
Total Accumulator	55	U	U	10

\* The field length is 45 bytes (compatible with 8142 format)

The most significant digit of the weight data fields will be a space for positive weights and a minus for negative weights. Weight data fields never contain decimal point or dummy zero.

**D.3.1. (A) All Functions (Upload Only)**

Host Transmission					
ASCII	STX	2	U	A	CR
Hex	02	32	55	41	0D

IND570 Response					
STX	2	U	A	All Functions max. 187 Byte Data Field	CR
02	32	55	41		0D

The All Functions Data Field consists of:

- Displayed Weight: (7 Bytes)
- Gross Weight: (7 Bytes)
- Tare Weight: (7 Bytes)
- Net Weight: (7 Bytes)
- Time/Date: (12 Bytes)
- Next Transaction Number: (6 Bytes)
- Status Bytes: (6 Bytes)
- Setup Bytes (12 Bytes) *(Present in All Functions Field, but not a supported feature)*
- Active Targets 1,2,3,4: (24 Bytes, Targets 2,3,4 are always 0)
- Active Target, Fine Feed, Spill, Tol: (24 Bytes)
- Target-2, Fine Feed-2, Spill-2, Tol-2: (24 Bytes, always 0) *(Present in All Functions Field, but not a supported feature)*
- Terminal ID 1: (6 Bytes, first 6 bytes of terminal ID #1)
- Last Printed Data (45 Bytes Default)

**D.3.2. (B) Displayed Weight (Upload Only)**

Host Transmission					
ASCII	STX	2	U	B	CR
Hex	02	32	55	42	0D

IND570 Response					
STX	2	U	B	Displayed Weight 7 Byte Data Field	CR
02	32	55	42		0D

**D.3.3. (C) Gross Weight (Upload Only)**

Host Transmission					
ASCII	STX	2	U	C	CR
Hex	02	32	55	43	0D

IND570 Response					
STX	2	U	C	Gross Weight 7 Byte Data Field	CR
02	32	55	43		0D

**D.3.4. (D) Tare Weight (Upload)**

Host Transmission					
ASCII	STX	2	U	D	CR
Hex	02	32	55	44	0D

IND570 Response					
STX	2	U	D	Tare Weight 7 Byte Data Field	CR
02	32	55	44		0D

**D.3.5. (D) Tare Weight (Download)**

Host Transmission						
ASCII	STX	2	D	D	Tare Weight 7 Byte Data Field	CR
Hex	02	32	44	44		0D

**D.3.6. (E) Net Weight (Upload Only)**

Host Transmission					
ASCII	STX	2	U	E	CR
Hex	02	32	55	45	0D

IND570 Response					
STX	2	U	E	Net Weight 7 Byte Data Field	CR
02	32	55	45		0D

**D.3.7. (F) Time/Date (Upload)**

The time format to the IND570 terminal is fixed as HHMMSS. The date format is DDMMYY.

Host Transmission					
ASCII	STX	2	U	F	CR
Hex	02	32	55	46	0D

IND570 Response						
STX	2	U	F	Time and Date		CR
02	32	55	46	12 Byte Data Field		0D

**D.3.8. (F) Time/Date (Download)**

Host Transmission						
ASCII	STX	2	D	F	Time and Date	
Hex	02	32	44	46	12 Byte Data Field	
						CR
						0D

**D.3.9. (G) Next Transaction Number (Upload)**

Only the six least significant digits are sent using this command. The two most significant digits are not available

Host Transmission						
ASCII	STX	2	U	G	CR	
Hex	02	32	55	47	0D	

IND570 Response						
STX	2	U	G	Current Consecutive Number		CR
02	32	55	47	6 Byte Data Field		0D

**D.3.10. (G) Next Consecutive Number (Download)**

Host Transmission						
ASCII	STX	2	D	G	Current Consecutive Number	
Hex	02	32	44	47	6 Byte Data Field	
						CR
						0D

**D.3.11. (H) Clear Last Printed Data from Memory (Download or Upload)**

Host Transmission						
Hex	02	32	44 or 45	48	0D	

**D.3.12. (I) Status Bytes (Upload Only)**

Host Transmission						
ASCII	STX	2	U	I	CR	
Hex	02	32	55	49	0D	

IND570 Response						
STX	2	U	I	Status Bytes		CR
02	32	55	49	6 Byte Data Field		0D

Bit Identification Table for Status Byte A			
Bits 0, 1 and 2			
0	1	2	Decimal Point Location
0	0	0	X.XXX00
1	0	0	XX.XXX0
0	1	0	XXX.XXX
1	1	0	XXXX.XX
0	0	1	XXXXX.X
1	0	1	XXXXXX
0	1	1	XXXXX0
1	1	1	XXXX00
Bits 3 and 4			Build Code
3	4		
1	0		X1
0	1		X2
1	1		X5
Bit 5			Always = 1
Bit 6			Always = 0

Bit Identification Table for Status Byte B	
Status Bits	Function
Bit 0	Gross = 0, Net = 1
Bit 1	Sign, Positive = 0, Negative = 1
Bit 2	Out of Range = 1 (Over capacity or Under zero)
Bit 3	Motion = 1
Bit 4	lb = 0, kg = 1 (see also Status Byte C, bits 0-2)
Bit 5	Always = 1
Bit 6	Zero Not Captured = 1

Bit Identification Table for Status Byte C			
Bits 0, 1 and 2			Weight Description
2	1	0	
0	0	0	lb or kg, selected by status byte B, bit 4
0	0	1	grams (g)
0	1	0	metric tons (t)
0	1	1	ounces (oz)
1	0	0	troy ounces (ozt)
1	0	1	penny weight (dwt)
1	1	0	tons (ton)

Bit Identification Table for Status Byte C			
1	1	1	custom units
Bit 3			Print Request = 1
Bit 4			Expand Data x 10 = 1
Bit 5			Always = 1
Bit 6			Preset tare = 1

Byte D = Full Scale Increments = scale capacity / increment / 1000.

Status Byte E Bit Definitions	
Function	Bit
Tolerance Mode: Always = 1	0
Target Mode: Always = 1	1
Reserved, Always a 0	2
Reserved, Always a 0	3
Reserved, Always a 0	4
Reserved, Always a 0	5
Always a 1	6

Status Byte F Bit Definitions	
Function	Bit
Target 1 Feeding	0
Reserved Always = 0	1
Target 1 Fast Feeding	2
Reserved Always = 0	3
Tolerance 1, In Tolerance = 1	4
Reserved Always = 0	5
Always a 1	6

### D.3.13. (K) Control Bytes (Download)

Only 1 control byte function can be used at a time. If more than 1 control byte function is desired then repeat the control byte function once for each function desired.

Control bytes A and B are used to control the display. Control byte C is used to clear subtotal and total accumulators.

Host Transmission								
ASCII	STX	2	D	K	CBA	CBB	CBC	CR
Hex	02	32	44	4B				0D

Control Byte A (CBA) Bit Definition Control Byte B (CBB) Bit Definition			
Function	Bit	Function	Bit
Print Request = 1	0	Reserved	0
Switch to primary units = 1	1	Reserved	1
Switch to second units = 1	2	Reserved	2
Clear Tare = 1	3	Reserved	3
Autotare = 1	4	Reserved	4
Zero = 1	5	Blank Display = 1 Restore = 0	5
Always a 1	6	Always a 1	6

Control Byte C (CBC) Bit Definition	
Function	Bit
Clear Subtotal Accumulator = 1	0
Clear Total Accumulator = 1	1
Reserved	2
Reserved	3
Reserved	4
Reserved	5
Always a 1	6

#### D.3.14. (L) Target 1 (Upload)

Target value is six numeric digits with no decimal point, just first 6 byte is used for Target, others bytes is always 0.

Host Transmission					
ASCII	STX	2	U	L	CR
Hex	02	32	55	4C	0D

IND570 Response					
STX	2	U	L	Targets	CR
02	32	55	4C	24 Byte Field	0D

#### D.3.15. (L) Targets 1 (Download)

Host Transmission						
ASCII	STX	2	D	L	Targets	CR
Hex	02	32	44	4C	24 Byte Field	0D

**D.3.16. (N) #1 Target, Fine Feed, Spill, Weight Tolerance (Upload)**

Target, Fine Feed, Spill and tolerance values must be downloaded even if only one value is changed. Each value is six digits without decimal point.

Host Transmission					
ASCII	STX	2	U	N	CR
Hex	02	32	55	4E	0D

IND570 Response					
STX	2	U	N	#1: Target, Fine Feed, Spill, Tolerance. 24 Byte Field	CR
02	32	55	4E		0D

**D.3.17. (N) #1 Target, Fine Feed, Spill, Weight Tolerance (Download)**

Host Transmission						
ASCII	STX	2	D	N	#1: Target, Fine Feed, Spill, Tolerance. 24 Byte Field	CR
Hex	02	32	44	4E		0D

**D.3.18. (P) Response to ID #1 (Upload)**

Only the first six characters are available.

Host Transmission					
ASCII	STX	2	U	P	CR
Hex	02	32	55	50	0D

IND570 Response					
STX	2	U	P	Terminal ID 6 bytes field	CR
02	32	55	50		0D

**D.3.19. (P) Response to ID #1 (Download)**

Host Transmission						
ASCII	STX	2	D	P	Terminal ID 6 byte field	CR
Hex	02	32	44	50		0D

**D.3.20. (Q) Last Printed Data (Upload)**

This function code will return the last printed data in the format specified by print template pt0101. If pt0101 is cleared to a blank condition, the response from the terminal duplicates the format of the 8142. The 8142 format is shown below.

Host Transmission					
ASCII	STX	2	U	Q	CR
Hex	02	32	55	51	0D



IND570 Response						
ASCII	STX	2	U	Q	Data per pt0101 (default 45 bytes)	CR
Hex	02	32	55	51		OD

Format for pt0101 when it is cleared.

Data Length	
Gross Weight	7
Tare Weight	7
Net Weight	7
Time	6
Date	6
CN	6
Spaces	6

- Note: The IND570 terminal can be configured to warn the operator and halt printing if the transaction memory buffer becomes full. Refer to the Memory Program block.

### D.3.21. (T) Subtotal Accumulator (Upload Only)

Host Transmission					
ASCII	STX	2	U	T	CR
Hex	02	32	55	54	OD

IND570 Response					
STX	2	U	T	Subtotal Accumulator 10 Byte Data Field	CR
02	32	55	54		OD

### D.3.22. (U) Total Accumulator (Upload Only)

Host Transmission					
ASCII	STX	2	U	U	CR
Hex	02	32	55	55	OD

IND570 Response					
STX	2	U	U	Total Accumulator 10 Byte Data Field	CR
02	32	55	55		OD

# E 8530 Host Protocol

## E.1. Overview

The data format used by the IND570 protocol is either a 10 or 11 bit ASCII frame which consists of:

- 1 start bit
- 7 data bits
- 1 selectable parity bit
- 1 or 2 stop bits

A selectable checksum character is provided to ensure the integrity of the data.

There are 2 basic types of communication that occur between the host and the IND570 terminal:

**Upload** The host requests information from the IND570 terminal. The IND570 terminal responds to the request.

**Download** The host transmits new data to the IND570 terminal.

The IND570 commands differ from the 8530 because of the differences in functionality. The following are not supported in the IND570:

- Setup Bytes (J)
- Target (Setpoint) 2 (M)
- Target (Setpoint) 3 (N)
- Target (Setpoint) 4 (O)

Another difference is that the 8530 only supported lb or kg, while the IND570 supports many units, so the units indication / selection is primary and secondary.

■ **Note:** All 8530 commands previously referred to as Setpoint will now be listed as Target. Target is the current terminology used in the IND570.

## E.2. Data Packet Format

All transmissions by the host or the IND570 terminal are in the format shown below.

Data	STX	ADR	DIR	FCT	Data Field	CR	CHK
Notes	A	B	C	D	E	F	G

### E.2.1. Table Notes

- A <STX> ASCII Start of Text Character, Hex 02.
- B <ADR> IND570 scale address selected in setup, must be from an ASCII 2 to 9.
- C <DIR> Data Direction, "U" = Upload (IND570 to Host), "D" = Download (Host to IND570)
- D <FCT> Function code, refer to Function Code Table 6-9.
- E <Data Field> The data field is either the uploaded data from the 8142 or the downloaded data from the host. Not all function codes use the data field.
- F <CR> ASCII Carriage Return, Hex 0D
- G <CKS> Optional Checksum Character, 2's complement of the 7 low order bits of the binary sum of all characters on a line, preceding the checksum.

## E.3. Host Interface Message Format

### E.3.1. Host Port Function Codes

No error detection beyond checksum is provided for downloads. The IND570 terminal ignores any command it does not understand. When critical data such as Target data is downloaded from the host to the IND570 terminal, it is recommended that the host device upload (read back) the data downloaded to the IND570 terminal to verify that the data was received correctly.

Function Code Description	Function Code		Direction	Data Field Length
	Hex	ASCII		
Read All Functions	41	A	U	116
Displayed Weight	42	B	U	8
Gross Weight	43	C	U	8
Tare Weight	44	D	U/D	8
Net Weight	45	E	U	8
Time and Date	46	F	U/D	12
Current Consecutive Number	47	G	U/D	6
Status Bytes	49	I	U	2
Control Bytes	4B	K	D	2
Target 1	4C	L	U/D	7
Terminal ID 1	50	P	U/D	12
Subtotal Accumulator	51	Q	U	11
Total Accumulator	52	R	U	11

#### E.3.1.1. (A) Read All Functions (Upload Only)

Host Transmission					
ASCII	STX	2	U	A	CR
Hex	02	32	55	41	0D

IND570 Response					
STX	2	U	A	All Functions 116 Byte Data Field	CR
02	32	55	41		OD

Weight data fields will include decimal point and sign character if necessary.

The All Functions data field consists of:

Displayed Weight	8 Bytes
Gross Weight	8 Bytes
Tare Weight	8 Bytes
Net Weight	8 Bytes
Time/Date	12 Bytes
Next Consecutive Number	6 Bytes
Status Bytes	2 Bytes
Setup Bytes	2 Bytes (Present in All Functions Field Always = 0, but not a supported feature)
Target 1	28 Bytes, first 7 bytes are used for Target, others are always 0
Response to ID #1	12 bytes, first 12 bytes of terminal ID #1
Subtotal Accumulator	11 Bytes
Total Accumulator	11 Bytes

### E.3.1.2. (B) Displayed Weight (Upload Only)

Host Transmission					
ASCII	STX	2	U	B	CR
Hex	02	32	55	42	0D

IND570 Response					
STX	2	U	B	Displayed Weight 8 Byte Data Field	CR
02	32	55	42		OD

### E.3.1.3. (C) Gross Weight (Upload Only)

Host Transmission					
ASCII	STX	2	U	C	CR
Hex	02	32	55	43	0D

IND570 Response					
STX	2	U	C	Gross Weight 8 Byte Data Field	CR
02	32	55	43		OD

**E.3.1.4. (D) Tare Weight (Upload)**

Host Transmission					
ASCII	STX	2	U	D	CR
Hex	02	32	55	44	0D

IND570 Response					
STX	2	U	D	Tare Weight 8 Byte Data Field	CR
02	32	55	44		0D

**E.3.1.5. (D) Tare Weight (Download)**

Downloaded tare weight value must match the displayed increment type and size programmed into the IND570 terminal or else the downloaded value is ignored.

Host Transmission						
ASCII	STX	2	D	D	Tare Weight 8 Byte Data Field	CR
Hex	02	32	44	44		0D

**E.3.1.6. (E) Net Weight (Upload Only)**

Host Transmission					
ASCII	STX	2	U	E	CR
Hex	02	32	55	45	0D

IND570 Response					
STX	2	U	E	Net Weight 8 Byte Data Field	CR
02	32	55	45		0D

**E.3.1.7. (F) Time/Date (Upload)**

Host Mode time and date format is [HHMMSSDDMMYY] HH = hours, MM = minutes, SS = seconds, DD = day, MM = month and YY = year.

Host Transmission					
ASCII	STX	2	U	F	CR
Hex	02	32	55	46	0D

IND570 Response					
STX	2	U	F	Time and Date 12 Byte Data Field	CR
02	32	55	46		0D

**E.3.1.8. (F) Time/Date (Download)**

Host Transmission						
ASCII	STX	2	D	F	Time and Date 12 Byte Data Field	CR
Hex	02	32	44	46		0D

**Note:** Host command function code H (hex value 48) is not used with the 8530 host interface.

**E.3.1.9. (G) Next Consecutive Number (Upload)**

Host Transmission					
ASCII	STX	2	U	G	CR
Hex	02	32	55	47	0D

IND570 Response					
STX	2	U	G	Current Consecutive Number 6 Byte Data Field	CR
02	32	55	47		0D

**E.3.1.10. (G) Next Consecutive Number (Download)**

Host Transmission						
ASCII	STX	2	D	G	Current Consecutive Number 6 Byte Data Field	CR
Hex	02	32	44	47		0D

**E.3.1.11. (I) Status Bytes (Upload Only)**

Status bytes 1 and 2 provide information about the operation of the IND570 terminal.

Host Transmission					
ASCII	STX	2	U	I	CR
Hex	02	32	55	49	0D

IND570 Response						
STX	2	U	I	S	S	CR
02	32	55	49	B	B	0D
				1	2	

Status Byte 1 Bit Definition	
Function	Bit
Gross = 0, Net = 1	0
Positive = 0, Negative = 1	1
Out of Range = 1 (Over capacity or Under Zero)	2
Motion = 1	3

Status Byte 2 Bit Definition	
Function	Bit
Target 1 Feeding = 1	0
Reserved	1
Reserved	2
Reserved	3

Status Byte 1 Bit Definition		Status Byte 2 Bit Definition	
Primary = 0 Secondary = 1	4	Print Request = 1	4
Always = 1	5	Expanded Weight Display = 1	5
Zero Not Captured = 1	6	Always a 1	6

### E.3.1.12. (K) Control Bytes

Only one control byte function can be used at a time. If more than 1 control byte function is desired then repeat the control byte function once for each function desired.

Host Transmission							
ASCII	STX	2	D	K	CBA	CBB	CR
Hex	02	32	44	4B			0D

Control Byte A Bit Definition	
Function	Bit
Print Request = 1	0
Switch to Primary Unit = 1	1
Switch to Second Unit = 1	2
Clear Tare = 1	3
Auto Tare = 1	4
Zero = 1	5
Always = 1	6

Control Byte B Bit Definition	
Function	Bit
Reserved	0
Reserved	1
Reserved	2
Reserved	3
Reserved	4
Reserved	5
Always = 1	6

### E.3.1.13. (L) Target 1 (Upload/Download)

The Target values for Target 1 are accessed individually by function code "L" (hex 4C). Targets 2-4 and function codes "M", "N" and "P" (hex values 4D, 4E and 4F) are not supported.

Host Transmission					
ASCII	STX	2	U	L	CR
Hex	02	32	55	4C	0D

IND570 Response					
STX	2	U	L	Target 1	CR
02	32	55	4C	7 Byte Data Field	0D

### E.3.1.14. (L) Targets 1 (Download)

Downloaded Target value must match the displayed increment type and size programmed into the IND570 terminal or else the downloaded value is ignored. It is highly recommended that you upload the Target data after a download to verify that the IND570 terminal has accepted the downloaded Target value.

Host Transmission						
ASCII	STX	2	D	L	Target 1 7 Byte Data Field	CR
Hex	02	32	44	4C		0D

**E.3.1.15. (P) Response to ID #1 (Upload)**

Host Transmission						
ASCII	STX	2	U	P	CR	
Hex	02	32	55	50	0D	

IND570 Response						
STX	2	U	P	Terminal ID 12 Byte Field	CR	
02	32	55	50		0D	

**E.3.1.16. (P) Response to ID #1 (Download)**

Host Transmission						
ASCII	STX	2	D	P	Terminal ID 12 Byte Field	CR
Hex	02	32	44	50		0D

**E.3.1.17. (Q) Subtotal Accumulator (Upload Only)**

Host Transmission						
ASCII	STX	2	U	Q	CR	
Hex	02	32	55	51	0D	

IND570 Response						
STX	2	U	Q	Subtotal Accumulator 11 Byte Data Field	CR	
02	32	55	51		0D	

**E.3.1.18. (R) Total Accumulator (Upload Only)**

Host Transmission						
ASCII	STX	2	U	R	CR	
Hex	02	32	55	52	0D	

IND570 Response						
STX	2	U	R	Total Accumulator 11 Byte Data Field	CR	
02	32	55	52		0D	



# F PT6S3 Protocol

PT6S3 protocol includes the commands of its predecessors, notably PT6S2, the most common, in order to maintain full compatibility of the functions. This protocol allows the replacement of an old model indicator in an existing installation. This installation interrogates uniquely with upper-case letters commands. New functions are obtained from commands with lower-case letters.

## F.1. Overview

The "slave" indicator recognizes certain ASCII characters transmitted by the "master" terminal (computer or automaton). This protocol therefore contains all of the functions of PT6S2 necessary for an indicator with a single measuring channel. The functions related to the commands issued by a master terminal are shown in Table F-1.

**Table F-1: Functions Related to the Commands Issued by a Master Terminal**

- P** Request for the value of the weight displayed on the indicator
- M** Request for zeroing the weight indicator
- T** Request for semi-automatic taring with weighing in net or return to gross weighing if the tare is already activated.
- R** Request for gross weighing

The new commands specific to PT6S3 are shown in Table F-2:

**Table F-2: FNew Commands Specific to PT6S3**

- P** - Request to read the weight displayed on the indicator; no print command is issued
- m** - Request to zero the main display of the indicator
- t** - Request for semi-automatic tare while in net mode, or to return to gross weighing if tare already activated
- n** - Request to enter net mode
- r** - Request to enter gross mode
- g** - Read metrological parameters
- z** - Read minimum weighing capacity
- w** - Read maximum weighing capacity
- q** - Request for simultaneous read of displayed weight and ticket number (5 digits) for indicator with printer (with DTR management); a demand print command is also issued

## F.2. Principle of Operation

The character frame, represented below, can be programmed. This permits obtaining either a "simple format" identical to the format used in PT6S2, or a more flexible "extended format".

P1	Body of the response	P2	CKS	P3
----	----------------------	----	-----	----

P1, P2, P3: Characters which can be programmed, chosen between 000 and 255 (decimal). By default, the following characters are installed when the device is powered on:

P1 = CR (013)

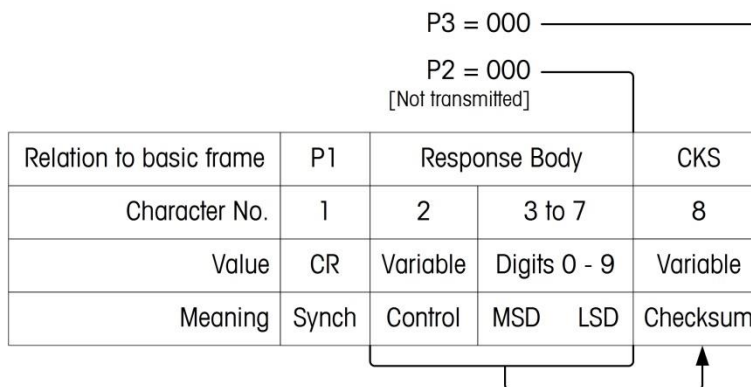
P2 = 000

P3 = 000

Zero values are not transmitted; therefore, in this case the format is similar to the PT6S2 format.

## F.3. Characteristics of the Simple Format (PT6S2 Style)

The frame is represented in Figure F-1.



**Figure F-1: Character Frame**

The checksum is obtained by binary addition without carryover of Characters No 2 to 7.

The control character (No 2) can contain the information shown in Table F-3.

**Table F-3: Control Character (No 2) Information**

<b>I</b>	Value of the weight stable
<b>SPC (space)</b>	Value of the weight not stable
<b>D</b>	Gross weight below "blank under zero" limit
<b>S</b>	Gross weight above "blank over capacity" limit
<b>*</b>	Request from the master has been executed

#	Request from the master cannot be executed. Characters No 3 to 7 contain the gross weight, stable or not
---	--

### F.3.1. Response to an Upper-Case Letter Command

Table F-4 shows the P, M, T, R commands defined previously. The body of the response made up of the 5 characters No 3 to 7 is shown, with character 7 giving the least significant digit.

**Table F-4: FP, M, T, R Commands**

<b>P</b>	5 digits of the weight of the indicator (GROSS or NET)
<b>M</b>	5 digits at 0 if the setting to 0 was executed. 5 digits of the weight if the command was not executed.
<b>T</b>	5 digits of the weight displayed after the request (0 or gross weight).
<b>R</b>	5 digits of the GROSS weight.

- Functions M and T can be executed only if immobility is effective at the time of the request. If not, an answer with a "#" control character is made.

### F.3.2. Response to a Lower-Case Letter Command

Some of the commands using lower-case letters, such as p, m, t, r, are identical to those made in upper-case letters. When using a lower-case letter the:

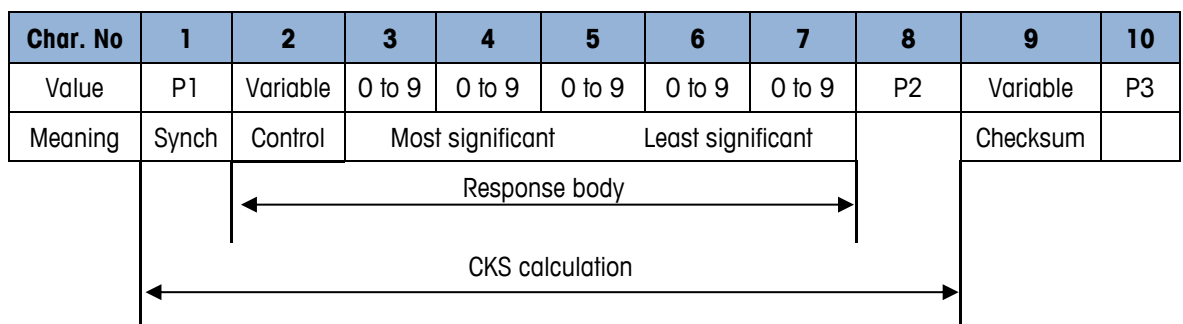
- Response is obtained in the same format.
- Control character takes one of the information items defined for PT6S3.
- The checksum is different because it is calculated by taking into account character No 1 (013).

## F.4. Characteristics of the Extended Format

### F.4.1. Response Frame

The various commands supported are defined previously. Two types of responses are given, depending on their size.

Commands p, m, t, r, g, z, w give responses with the same size (six-character response body). In this case, the frame layout is as shown in Figure F-2.

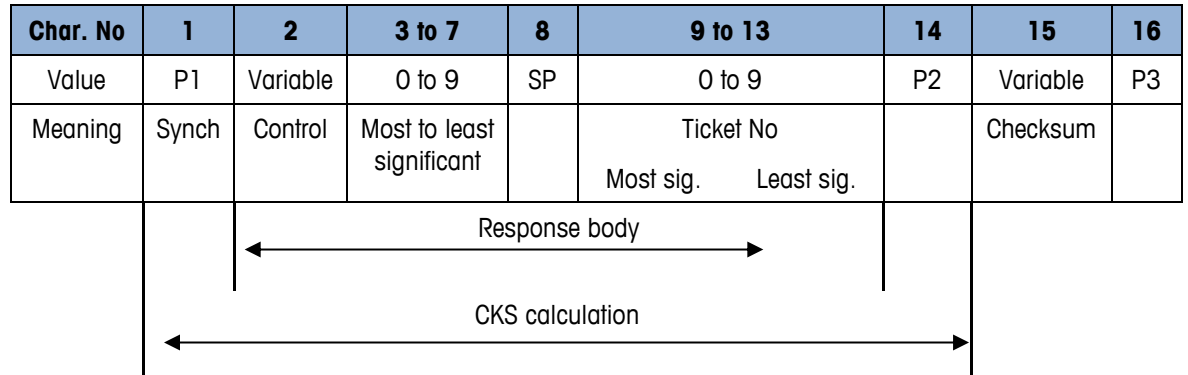


**Figure F-2: Frame Layout**

The "q" command generates a response with a bigger size.

The response body is increased by five digits for the ticket number, and a separating space.

The frame is composed as shown in Figure F-3.



**Figure F-3: Frame Composition**

#### F.4.2. Calculation of the Checksum Character (CK-S)

To calculate the checksum character, the following operations are performed successively:

1. Binary sum, without carryover, of all the characters composing P1 + Response body + P2.
2. Comparison of this result to 20 (hex) by applying a 7f mask.
3. If the result is lower than 20 (hex), 20 (hex) is added to it.

This last result is the checksum It is therefore always comprised between 20 (hex) and 7f (hex) (Printable character).

#### F.4.3. Indication of Control Character

Indication of the control character and specific contents of the response body for each of the "lower-case" commands is as follows:

##### F.4.3.1. p – Request for reading the weight displayed on the main indicator (No demand print command is issued)

Response—Character No 3 to 7—five digits of the displayed weight (gross or net)

Character No 2 (Control)

- "l" if gross positive immobile
- "I" if gross negative immobile
- " " if gross positive not immobile
- "-" if gross negative not immobile
- "N" if net positive immobile
- "n" if net negative immobile
- "B" if net positive not immobile
- "b" if net negative not immobile
- "D" if indicator in under tare

- "S" if indicator in overload
- "Z" if indicator on metrological zero, unstable
- "z" if indicator on metrological zero, stable

**F.4.3.2. m – Request for zeroing the indication of the indicator**

Condition: Weight stable and comprised in a range of  $\pm 2\%$  of the weighing capacity around the initial zero.

Response: Command executed = Characters No 3 to 7 all at 0.

Command not executed = The gross or net displayed weight in the measuring range.

Character No 2 (Control)

- "m" if command executed
- "#" if command not executed (instability, out of range, ...)

**F.4.3.3. t – Request for semi-automatic taring with weighing in net, or return to weighing in gross if the tare is already activated (toggle)**

Condition: Weight stable

Response: The control character contains:

- "t" if the request was executed. (Characters No 3 to 7 represent the weight displayed after the request: 0 or gross weight)
- "#" if taring cannot be executed. (Characters No 3 to 7 represent the gross weight, within the measuring range)

**F.4.3.4. n – Request to enter net mode (taring), (non-toggle, unidirectional)**

Condition: Stable weight

Response: The control character contains:

- "n" if the response was executed. Characters no 3 to 7 are at 0.
- "#" if not executed. Characters No 3 to 7 represent the unsigned gross or net weight in the measuring range.

■ For functions "m", "t", and "n" to be executed, immobility must be effective at the time of the request. If immobility is not set, the slave answers #.

**F.4.3.5. r – Request for gross-mode weighing**

Response: The control character contains:

- "r" if the request is executed. (Characters No 3 to 7 contain the gross weight).
- "#" if the request cannot be executed. (The contents of characters No 3 to 7 is not significant.)

- Commands "n" and "r" are complementary. With command "t", they permit all the possibilities of semi-automatic taring and of return to gross weigh mode.

#### F.4.3.6. g – Reading of metrological parameters

Response:

Character No	2	3	4	5	6	7
Symbol	C.C.	Spc	V	U	P	Z

C.C.: Control character with the value:

"g" if request is accepted

"#" if request cannot be executed

spc: defines a space (ASCII code 20H)

V : Number of digits before the decimal point (including non significant zero)

U : Weight measurement unit, with the values:

"t" for ton

"k" for kilogram

P: Weight unit step, value 1, 2 or 5

Z: Number of fixed zeros, with value 0 or 1.

#### F.4.3.7. z – Reading of minimum weighing capacity

Response: The control character contains:

"z" if the reading was made. (Characters No 3 to 7 represent the minimum weighing capacity)

"#" if the reading is impossible (Characters No 3 to 7 are not significant)

#### F.4.3.8. w – Reading of maximum weighing capacity

Response: The control character contains:

"w" if the request is executed. (Characters no 3 to 7 return the value of the weighing capacity recorded in the memories of the measurer).

"#" if the reading cannot be executed. (In this case characters no 3 to 7 are not significant).

- All lower-case commands above are common to the measurers of the series TX30.....TX40. The "q" command described hereafter does not apply to the TX30 measurer, only to those that have several simultaneous links.

**F.4.3.9. q – Request for simultaneous reading of the displayed weight and of the five-digit ticket (also issues a Demand print command)**

Master's command: q

The response body was described in Characteristics of the Extended Format, the Response Frame section.

Necessary condition: Weight stable within the measuring range.

The control character (No 2) takes the following forms:

- All of the forms obtained in response to command "p" (see p – Request for reading the weight displayed on the main indicator) if the request is executed.
- "!" in case of printer fault

In this latter case, the value returned for the weight is null. The ticket number is not incremented (it keeps the last value taken).

- The ticket number increments by one unit at each valid response of the "q" function. The ticket number is never reset to zero.

**F.4.3.10. Response to an Upper-Case Letter Command**

In this case the response is forced into the PT6S2 simplified format and the

- Frame is given with P1 = CR (013), P2 and P3 are forced to 0
- Control character also takes simplified forms
- Checksum also is simple

**F.4.3.11. Response to an Unknown Command**

F.4.3.11.1. Case Where P1 = CR, P2 = P3 = 0

PT6S2-style protocol (simple)

The response will be made in the PT6S2 format as follows, irrespective of the (lower- or upper-) case of the unknown command letter.

Character No	1	2	3	4	5	6	7	8
	CR 013	?	0	0	0	0	0	<

CKS

F.4.3.11.2. Case Where P1 ≠ CR, P2 ≠ 0, P3 ≠ 0

PT6S3 style protocol (extended)

The response will be made in the PT6S3 format as follows, irrespective of the (upper- or lower-) case of the unknown command letter.

Character No	1	2	3	4	5	6	7	8	9	10
Value	P1	?	0	0	0	0	0	P2	CKS	P3

**F.4.3.12. Response to an Invalid Command**

A response is sent for each request. If the response is not valid, another request must be made. This protocol avoids blocking the data processing system dialog



# G METTLER TOLEDO

## Continuous Short Output Mode

The continuous short mode format is provided to allow continuous data output while maintaining high-speed update rates. The short form continuous output differs from the standard continuous output format in that the short format does not send the tare weight data field.

**Table G-1: Continuous Short Output Format**

Continuous Short Format											
STX	SWA	SWB	SWC	MSD	-	-	-	-	LSD	CR	CKS
1	2 STATUS BYTES			3 GROSS / NET WEIGHT					4	5	

**Continuous Short Output Format Notes:**

1. <STX> ASCII Start of Text Character, Hex 02.
2. <SWA>, <SWB>, <SWC> Status Word Bytes A, B, and C. Refer to the Bit Identification Tables for individual bit definition.
3. Displayed weight. Six digits, no decimal point or sign. Non-significant leading zeros are replaced with spaces in the lb weight unit mode.
4. <CR> ASCII Carriage Return, Hex 0d.
5. <CKS> Optional checksum character, 2's complement of the 7 low order bits of the binary sum of all characters on a line preceding the checksum, including the STX and CR.

Table G-2, Table G-3 and Table G-4 detail the standard status bytes for standard continuous short output.

**Table G-2: Status Word A Bit Definitions**

Bits 2, 1, and 0			
2	1	0	Decimal Point Location
0	0	0	XXXXX00
0	0	1	XXXXX0
0	1	0	XXXXXX
0	1	1	XXXXX.X

Bits 2, 1, and 0			
1	0	0	XXXX.XX
1	0	1	XXX.XXX
1	1	0	XX.XXXX
1	1	1	X.XXXXX
Bits 4 and 3			Build Code
4	3		
0	1		X1
1	0		X2
1	1		X5
Bit 5			Always = 1
Bit 6			Always = 0

**Table G-3: Status Word B Bit Definitions**

Status Bits	Function
Bit 0	Gross = 0, Net = 1
Bit 1	Sign, Positive = 0, Negative = 1
Bit 2	Out of Range = 1 (Over capacity or Under Zero)
Bit 3	Motion = 1, Stable = 0
Bit 4	lb = 0, kg = 1 (see also Status Word C, bits 0-2)
Bit 5	Always = 1
Bit 6	Zero Not Captured = 1

**Table G-4: Status Word C Bit Definitions**

Bits 2, 1, and 0			Weight Description
2	1	0	
0	0	0	lb or kg, selected by Status Byte B, bit 4
0	0	1	grams (g)
0	1	0	metric tons (t)
0	1	1	ounces (oz)
1	0	0	troy ounces (ozt)
1	0	1	penny weight (dwt)
1	1	1	tons (ton)
1	1	1	custom units
Bit 3			Print Request = 1
Bit 4			Expand Data x 10 = 1, Normal = 0

<b>Bit 5</b>	Always = 1
<b>Bit 6</b>	Always = 0

# H SMA Protocol

## H.1. Overview

The Scale Manufacturers Association (SMA) protocol is a standard serial communications protocol based on a "Master/Slave" or "Command/Response" architecture. The host device (PC or PLC) is always the commanding device and the scale never sends an unsolicited response.

The SMA protocol uses a simple command set based on a single ASCII character sent by the host device to the scale instrument. In turn the scale sends the required response back to the host. In reference to the SMA Scale Serial Communication Protocol document SMA SCP-0499 (rev 1, November 2005), Level #1 and Level #2 command sets have been defined. Level #1 addresses the functionalities present in a basic scale terminal, while Level #2 covers the more powerful features of an advanced terminal.

The SMA protocol is mostly intended for use in developing host communications with a single scale. Multi-scale terminals like the IND570 will require separate communication ports to provide access to the individual scales.

## H.2. Data Packet Format

Most transmissions by the host are in the standard format shown below.

Data	LF	FCT	Data Field	CR
Notes	A	B	C	D

### H.2.1. Table Notes

- A <LF> ASCII Line Feed Character, Hex 0A used to start the data frame.
- B <FCT> Function code, refer to Function Code Table below.
- C <Data Field> The data field is the downloaded data from the host. Not all function codes use or include the data field.
- D <CR> ASCII Carriage Return, Hex 0D used to end the data frame.

There is an Abort Command <ESC> that does not follow the standard format described above. It does not require the <LF> and <CR> characters.

Transmissions by the IND570 in response to most of the host commands are in the format shown below, with the exception of commands "D", "A", "B", "I" and "N" which have specific data definitions.

Data	LF	SB	RB	NB	MB	FB	Data Field	Units	CR
Notes	A	B	C	D	E	F	G	H	I

## H.2.2.

### Table Notes

- A <LF> ASCII Line Feed Character, Hex 0A used to start the data frame.
- B <SB> Scale status byte. See description below.
- C <RB> Weighing range byte. ("1" = first range, "2" = second range, "3" = third range, etc.).
- D <NB> Gross/net status byte. See description below.
- E <MB> Motion status byte. "M" (Hex 4D) indicates scale in motion and "Space" (Hex 20) indicates scale not in motion.
- F <FB> Reserved for future use. Always a "Space" (Hex 20).
- G <Data Field> The data field is the uploaded weight data from the IND570 terminal. This is a fixed ten characters field with leading spaces, a decimal point (if present) and a minus sign for negative weight values.
- H <Units> This is a fixed three characters field with trailing spaces to indicate the units of measure. See description below.
- I <CR> ASCII Carriage Return, Hex 0D used to end the data frame.

Response—Character <SB> (scale status byte):

- "Z" Center of zero
- "O" Over capacity
- "U" Under capacity blanking
- "E" Zero attempt failed error
- "I" Power up initial zero error
- "T" Taring attempt failed error
- " " None of the above conditions exist

- For "E", "I" and "T" error conditions, the <Data Field> weight information is sent as dashes (-----).

Response—Character <NB> (gross/net weight status byte):

- "G" Gross weight
- "T" Tare weight (in response to "M" command)
- "N" Net weight
- "g" Gross weight in x10 mode (in response to "H", "Q" or "S" command)
- "n" Net weight in x10 mode (in response to "H", "Q" or "S" command)

Response—Characters <Units> (units of measurement):

- "lb\_" Pounds
- "kg\_" Kilograms
- "g\_" Grams

"t_"	Metric tons
"ton"	Tons
"ozt"	Troy ounces
"dwt"	Pennyweights
"oz_"	Ounces

- For custom units, the user can configure up to 3 characters that is transmitted in the <Units> field.

## H.3. Host Interface Message Format

### H.3.1. Host Command Function Codes

The function code in the host command data packet determines what operation or data is accessed in the IND570 terminal. The Level #1 and Level #2 commands for the various functions supported by the IND570 terminal are listed in the Function Code Table (refer to Table H-1).

For these explicit commands issued by the host, there is always an expected response from the terminal within a certain period, with the exception of the <ESC> command. This provides some level of error handling for the host device. Furthermore the IND570 terminal also provides responses to unrecognized commands or data format.

**Table H-1: Function Code Table**

Function Code Description	Function Code		
	Level	Hex	ASCII
Request Displayed Weight	1	57	W
Request High Resolution (x10) Weight	2	48	H
Request Displayed Weight After Stability	2	50	P
Request High Resolution Weight After Stability	2	51	Q
Request To Zero Scale	1	5A	Z
Request To Tare Or Preset Tare Scale	2	54	T
Return Tare Weight	2	4D	M
Clear Scale Tare Weight	2	43	C
Change Units Of Measure	2	55	U
Invoke Scale Diagnostics	1	44	D
About Scale Data (First line)	1	41	A
About Scale Data (Scroll)	1	42	B
Scale Information (First line)	2	49	I
Scale Information (Scroll)	2	4E	N
Abort Command	1	1B	ESC

Function Code Description	Function Code		
	Level	Hex	ASCII
Repeat Displayed Weight Continuously	2	52	R
Repeat High Resolution Weight Continuously	2	53	S

### H.3.1.1. (W) Request Displayed Weight

Host Transmission			
ASCII	LF	W	CR
Hex	0A	57	0D

IND570 Response								
LF	SB	RB	NB	MB	SP	Displayed Weight 10 Bytes Data Field	Units 3 Bytes	CR
OA					20			OD

The terminal will respond with the scale status, weighing range, gross/net status, motion status and the displayed weight with the corresponding units.

### H.3.1.2. (H) Request High Resolution Weight

Host Transmission			
ASCII	LF	H	CR
Hex	0A	48	0D

IND570 Response								
LF	SB	RB	NB	MB	SP	X10 Weight 10 Bytes Data Field	Units 3 Bytes	CR
OA					20			OD

The terminal will respond with the scale status, weighing range, gross/net status, motion status and the displayed weight in high resolution (x10) with the corresponding units. The gross/net status byte <NB> will be indicated by "g" (67 Hex) or "n" (6E Hex).

### H.3.1.3. (P) Request Displayed Weight After Stability

Host Transmission			
ASCII	LF	P	CR
Hex	0A	50	0D

IND570 Response								
LF	SB	RB	NB	MB	SP	Displayed Weight 10 Bytes Data Field	Units 3 Bytes	CR
OA					20			OD

The terminal will respond with the scale status, weighing range, gross/net status, motion status and the stable displayed weight with the corresponding units. Since this command requests a stable

weight, there may be a significant delay before the response is returned, so it is the host's responsibility to handle the timeout error.

**H.3.1.4. (Q) Request High Resolution Weight After Stability**

Host Transmission			
ASCII	LF	Q	CR
Hex	0A	51	0D

IND570 Response								
LF	SB	RB	NB	MB	SP	X10 Weight 10 Bytes Data Field	Units 3 Bytes	CR
OA					20			OD

The terminal will respond with the scale status, weighing range, gross/net status, motion status and the stable displayed weight in high resolution (x10) with the corresponding units. The gross/net status byte <NB> will be indicated by "g" (67 Hex) or "n" (6E Hex). Since this command requests a stable weight, there may be a significant delay before the response is returned, so it is the host's responsibility to handle the timeout error.

**H.3.1.5. (Z) Request To Zero Scale**

Host Transmission			
ASCII	LF	Z	CR
Hex	0A	5A	0D

IND570 Response								
LF	SB	RB	NB	MB	SP	Displayed Weight 10 Bytes Data Field	Units 3 Bytes	CR
OA					20			OD

The terminal will respond with the scale status, weighing range, gross/net status, motion status and the displayed weight with the corresponding units. This function relies on the stability of the scale to perform the requested operation successfully. If the zero operation is successful a response is immediately returned.

If the conditions do not allow the operation to execute successfully after a certain timeout period, an error response is also returned. The scale status byte <SB> will represent a zero attempt success with a "Z" (5A Hex) and an "E" (45 Hex) if it fails. The weight data response field is represented by dashes if the attempt to zero fails.

**H.3.1.6. (T) Request To Tare Scale**

Host Transmission			
ASCII	LF	T	CR
Hex	0A	54	0D



IND570 Response								
LF	SB	RB	NB	MB	SP	Displayed Weight 10 Bytes Data Field	Units 3 Bytes	CR
OA					20			OD

The terminal will respond with the scale status, weighing range, gross/net status, motion status and the displayed weight with the corresponding units. This function relies on the stability of the scale to perform the requested operation successfully. If the tare operation is successful, a response is immediately returned with <SB> being indicated with a " " (20 Hex) and <NB> being indicated with an "N" (4E Hex).

If the conditions do not allow the operation to execute successfully after a certain timeout period, an error response is also returned with <SB> = "T" (54 Hex). The weight data response field is represented by dashes if the attempt to tare fails.

### H.3.1.7. (T) Preset Tare Scale

Host Transmission				
ASCII	LF	T	Tare Weight 10 Bytes Data Field	CR
Hex	OA	54		OD

IND570 Response								
LF	SB	RB	NB	MB	SP	Displayed Weight 10 Bytes Data Field	Units 3 Bytes	CR
OA					20			OD

This function allows for a preset tare value to be downloaded to the terminal. The downloaded value should match the current displayed units and increment size with leading spaces and a decimal point (if present).

The terminal will respond with the scale status, weighing range, gross/net status, motion status and the displayed weight with the corresponding units. If the preset tare operation is successful, a response is immediately returned with <SB> being indicated with a " " (20 Hex) and <NB> being indicated with an "N" (4E Hex).

If the conditions do not allow the operation to execute successfully, an error response is also returned with <SB> = "T" (54 Hex). The weight data response field is represented by dashes if the attempt to preset a tare value fails.

### H.3.1.8. (M) Return Tare Weight

Host Transmission			
ASCII	LF	M	CR
Hex	OA	4D	OD

IND570 Response								
LF	SB	RB	T	MB	SP	Tare Weight 10 Bytes Data Field	Units 3 Bytes	CR
OA			54		20			OD

The terminal will respond with the scale status, weighing range, gross/net status, motion status and the current tare weight with the corresponding units. The <NB> status byte is indicated with a "T" (54 Hex).

**H.3.1.9. (C) Clear Scale Tare Weight**

Host Transmission								
ASCII	LF	C	CR					
Hex	0A	43	0D					

IND570 Response								
LF	SB	RB	G	MB	SP	Gross Weight 10 Bytes Data Field	Units 3 Bytes	CR
OA			47		20			OD

This function allows the host to clear the tare weight and return the scale to gross weighing mode. The terminal will respond with the scale status, weighing range, gross/net status, motion status and the displayed gross weight with the corresponding units. The <NB> status byte is indicated with a "G" (47 Hex).

**H.3.1.10. (U) Change Units Of Measure**

Host Transmission			
ASCII	LF	U	CR
Hex	0A	55	0D

IND570 Response								
LF	SB	RB	NB	MB	SP	Displayed Weight 10 Bytes Data Field	Units 3 Bytes	CR
OA					20			OD

This function triggers the scale to switch between the primary and secondary units of measure. The terminal will respond with the scale status, weighing range, gross/net status, motion status and the displayed weight with the corresponding units.

**H.3.1.11. (D) Invoke Scale Diagnostics**

Host Transmission			
ASCII	LF	D	CR
Hex	0A	44	0D

IND570 Response					
LF	DB1	DB 2	DB 3	DB 4	CR
OA					OD

This function triggers a test on the internal BRAM and EEPROM memory, as well as a check on the state of the scale calibration based on the results of the last calibration test. After completion of the check, the terminal will respond with the BRAM, EEPROM and calibration status.

Response—Character <DB1> (diagnostic byte 1):

"R" = BRAM error or " " = no error.

Response—Character <DB2> (diagnostic byte 2):

"E" = EEPROM error or " " = no error.

Response—Character <DB3> (diagnostic byte 3):

"C" = Calibration error or " " = no error

Response—Character <DB4> (diagnostic byte 4): Reserved. Always a " ".

### H.3.1.12.

#### (A) About Scale Data (First Line)

Host Transmission			
ASCII	LF	A	CR
Hex	0A	41	0D

IND570 Response						
LF	S	M	A	:	About Data Field	CR
0A	53	4D	41	3A	Variable, 25 Bytes Max	0D

The terminal will respond with the first line of system data about the terminal and scale. The About data field indicates the SMA compliance level and revision. The level information is separated from the revision by a "/" (2F Hex) character.

### H.3.1.13.

#### (B) About Scale Data (Scroll)

Host Transmission			
ASCII	LF	B	CR
Hex	0A	42	0D

IND570 Response				
LF	Title Field	:	About Data Field	CR
0A	3 Bytes	3A	Variable, 25 Bytes Max	0D

With each "B" command sent, the terminal will respond with the next line of system data about the terminal and scale. Information on the manufacturer, model, firmware revision and serial number are each provided successively in individual responses. The title field (fixed 3 characters, left justified with trailing spaces) indicates which data is currently being read by the host.

Response—Title Field:

"MFG" Manufacturer (first response to "B" command).

"MOD" Product model (response to 2<sup>nd</sup> "B" command).

"REV" Product firmware revision (response to 3<sup>rd</sup> "B" command).

- “SN\_” Product serial number (response to 4<sup>th</sup> “B” command). The About data field is only included if a serial number is made available.
- “END” Last line of response to the “B” command. The About data field is not included in the “END” response.

Example:

- 1<sup>st</sup> Command = “B”      Response = “MFG:Mettler-Toledo, Inc.”
- 2<sup>nd</sup> Command = “B”      Response = “MOD:IND570”
- 3<sup>rd</sup> Command = “B”      Response = “REV:5.1.06 \* 03/05/2008”
- 4<sup>th</sup> Command = “B”      Response = “SN :1234”
- 5<sup>th</sup> Command = “B”      Response = “END:”

■ If additional “B” commands are issued after the last line of response, the terminal will respond with a <LF>?<CR>. The “A” command will reset the response to the “B” command back to the first line.

**H.3.1.14. (I) Scale information (First Line)**

Host Transmission						
ASCII	LF	I	CR			
Hex	0A	49	0D			

IND570 Response						
LF	S	M	A	:	Info Data Field	CR
0A	53	4D	41	3A	Variable, 25 Bytes Max	0D

The terminal will respond with the first line of metrology information about the scale. The Info data field indicates the SMA compliance level and revision. The level information is separated from the revision by a “/” (2F Hex) character.

**H.3.1.15. (N) Scale information (Scroll)**

Host Transmission			
ASCII	LF	N	CR
Hex	0A	4E	0D

IND570 Response				
LF	Title Field	:	Info Data Field	CR
0A	3 Bytes	3A	Variable, 25 Bytes Max	0D

With each “N” command sent, the terminal will respond with the next line of metrology information about the scale. Information on the scale type, capacity/increment, capacity/increment for other available weighing ranges and the list of SMA-supported commands are each provided successively in individual responses. The title field (fixed 3 characters, left justified with trailing spaces) indicates which data is currently being read by the host.

Response—Title Field:

- "TYP" Scale type (First response to "N" command where the Info data field = "S" for scale).
- "CAP" Capacity/increment (Response to 2<sup>nd</sup> or subsequent "N" commands depending on the number of weighing ranges programmed. The Info data field format being "uuu:c..c:n:d" where uuu = units, c..c = capacity, n = increment size and d = decimal point position).
- "CMD" SMA supported commands excluding Level #1, "I" and "N" commands (Response to subsequent "N" command).
- "END" Last line of response to the "N" command. The Info data field is not included in the "END" response.

Example (for a single range scale with a capacity/increment of 500 kg x 0.1 kg):

- 1<sup>st</sup> Command = "N"      Response = "TYP:S"
- 2<sup>nd</sup> Command = "N"      Response = "CAP:kg :500:1:1"
- 3<sup>rd</sup> Command = "N"      Response = "CMD:HPQRSTMCU"
- 4<sup>th</sup> Command = "N"      Response = "END:"

- If additional "N" commands are issued after the last line of response, the terminal will respond with a <LF>?<CR>. The "I" command will reset the response to the "N" command back to the first line.

#### H.3.1.16. (ESC) Abort Command

Host Transmission	
ASCII	ESC
Hex	1B

This command does not require the <LF> and <CR> characters to be transmitted and there is also no return response from the scale terminal. This function aborts any pending response expected from the scale terminal and acts like a reset, to free up the communications for the next host command.

#### H.3.1.17. (R) Repeat Displayed Weight Continuously

Host Transmission			
ASCII	LF	R	CR
Hex	0A	52	0D

IND570 Response								
LF	SB	RB	NB	MB	SP	Displayed Weight 10 Bytes Data Field	Units 3 Bytes	CR
OA					20			OD

The terminal will respond continuously with the scale status, weighing range, gross/net status, motion status and the displayed weight with the corresponding units. The <ESC> command or another single response command can be used to stop this continuous response.

**H.3.1.18. (S) Repeat High Resolution Weight Continuously**

Host Transmission			
ASCII	LF	S	CR
Hex	0A	53	0D

IND570 Response								
LF	SB	RB	NB	MB	SP	X10 Weight 10 Bytes Data Field	Units 3 Bytes	CR
OA					20			OD

The terminal will respond continuously with the scale status, weighing range, gross/net status, motion status and the displayed weight in high resolution (x10) with the corresponding units. The gross/net status byte <NB> will be indicated by "g" (67 Hex) or "n" (6E Hex). The <ESC> command or another single response command can be used to stop this continuous response.

**H.3.1.19. Unrecognized Command Response**

IND570 Response			
ASCII	LF	?	CR
Hex	0A	3F	0D

Any host command that the terminal does not support or recognize as valid will be responded to by the terminal with a "?" character.

**H.3.1.20. Communication Error Response**

IND570 Response			
ASCII	LF	!	CR
Hex	0A	21	0D

Any host command that the terminal does not recognize because of a communication error as a result of a parity or data framing mismatch will generate a terminal response with a "!" character.

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