PANTHER™

Terminal

Technical Manual

A14957000A
(4/98).02

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METTLER TOLEDO

Publication Revision History

An overview of this manual's revision history is compiled below.

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Part Number	Date	Revisions
A14957000A	8/97	Added Profibus and Modbus information.
A14957000A (.01)	12/97	Revised Tables on page 1-15 and 3-8, added step F8.6, revised warning labels. Added new illustration for analog output on page 2-17.
A14957000A (.02)	4/98	Minor edits throughout; new type font

Declaration of conformity
Konformitätserklärung
Déclaration de conformité
Declaración de Conformidad
Verklaring de overeenstemming
Dichiarazione di conformitá

We/Wir/Nous/WIJ/Noi: Mettler-Toledo, Inc.
1150 Dearborn Drive
Worthington, Ohio 43085
USA

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Model/Type: PANTHER

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CE Conformity / CE-Konformität / Conformité CE

90/384/EU	Nonautomatic Balances and Scales / Nichteselbsttätige Waagen / Balances à Functionnement non automatique
EN45501:1992	Adopted European Standard / Norme Européenne Adoptée / Angenommene Europäische Norm
89/336/EU	EMC Directive / EMU-Richtlinie / Directive concernant la CEM
EN55022, B	Emissions / Funkstörungen
EN50081-1	Immunity
73/23/EU	Low Voltage / Niederspannung / basse tension
EN60950	el. Safety / el. Sicherheit / sécurité el.

Other Directives and Standards / Andere Richtlinien und Normen / Autres documents
corresponding to local requirements / entsprechend lokalen Anforderungen / correspondant aux exigences locales

UL1950	el. Safety / el. Sicherheit / sécurité el. (if UL mark is applied)
C22.2 No. 950-M89	el. Safety / el. Sicherheit / sécurité el. (If cUL mark is applied)
FCC, Part 15, class A	Emissions / Funkstörungen

Darrell Flocken, Manager - Weights & Measures
Office of Weights and Measures
Worthington, Ohio USA
Revised February 1997 (added compliance to Non-automatic Weighing Instrument Directive)

according to EN45014

INTRODUCTION

This publication is provided solely as a guide for individuals who have received Technical Training in servicing the METTLER TOLEDO product.

Information regarding METTLER TOLEDO Technical Training may be obtained by writing to:

METTLER TOLEDO
350 W. Wilson Bridge Road
Worthington, Ohio 43085
(614) 438-4511

FCC Notice

This device complies with Part 15 of the FCC Rules and the Radio Interference Requirements of the Canadian Department of Communications. Operation is subject to the following conditions: (1) this device may not cause harmful interference, and (2) this device must accept any interference received, including interference that may cause undesired operation.

This equipment has been tested and found to comply with the limits for a Class A digital device, pursuant to Part 15 of FCC Rules. These limits are designed to provide reasonable protection against harmful interference when the equipment is operated in a commercial environment. This equipment generates, uses, and can radiate radio frequency energy and, if not installed and used in accordance with the instruction manual, may cause harmful interference to radio communications. Operation of this equipment in a residential area is likely to cause harmful interference in which case the user will be required to correct the interference at his own expense.

METTLER TOLEDO RESERVES THE RIGHT TO MAKE REFINEMENTS OR CHANGES WITHOUT NOTICE.

PRECAUTIONS

READ this manual BEFORE operating or servicing this equipment.

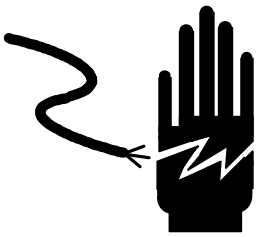
FOLLOW these instructions carefully.

SAVE this manual for future reference.

DO NOT allow untrained personnel to operate, clean, inspect, maintain, service, or tamper with this equipment.

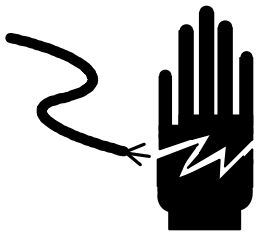
ALWAYS DISCONNECT this equipment from the power source before cleaning or performing maintenance.

CALL METTLER TOLEDO for parts, information, and service.



WARNING

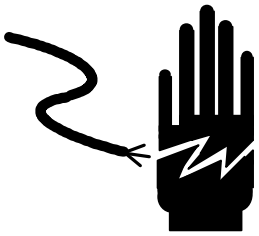
ONLY PERMIT QUALIFIED PERSONNEL TO SERVICE THIS EQUIPMENT. EXERCISE CARE WHEN MAKING CHECKS, TESTS AND ADJUSTMENTS THAT MUST BE MADE WITH POWER ON. FAILING TO OBSERVE THESE PRECAUTIONS CAN RESULT IN BODILY HARM.



WARNING

FOR CONTINUED PROTECTION AGAINST SHOCK HAZARD CONNECT TO PROPERLY GROUNDED OUTLET ONLY.

DO NOT REMOVE THE GROUND PRONG.



WARNING

DISCONNECT ALL POWER TO THIS UNIT BEFORE INSTALLING, SERVICING, CLEANING, OR REMOVING THE FUSE. FAILURE TO DO SO COULD RESULT IN BODILY HARM AND/OR PROPERTY DAMAGE.

CAUTION

BEFORE CONNECTING/DISCONNECTING ANY INTERNAL ELECTRONIC COMPONENTS OR INTERCONNECTING WIRING BETWEEN ELECTRONIC EQUIPMENT ALWAYS REMOVE POWER AND WAIT AT LEAST THIRTY (30) SECONDS BEFORE ANY CONNECTIONS OR DISCONNECTIONS ARE MADE. FAILURE TO OBSERVE THESE PRECAUTIONS COULD RESULT IN DAMAGE TO OR DESTRUCTION OF THE EQUIPMENT OR BODILY HARM.

CAUTION

OBSERVE PRECAUTIONS FOR HANDLING ELECTROSTATIC SENSITIVE DEVICES.

CONTENTS

1 Introduction

This manual describes basic programming, operation, and service techniques for the PANTHER Analog and Digital Industrial Scale Terminal, a high performance basic capability weighing instrument. The PANTHER has been designed to meet the needs of simple weight indicating applications, over/under manual checkweighing applications, and high speed batch processing applications.

PANTHER Terminal Overview

Ease-of-Installation

Multi-Voltage Power Supply - The PANTHER® Terminal uses a manually selectable universal power supply which can be used with 100,120, or 220/240 VAC sources, meeting global requirements. The harsh enclosure unit is shipped with an integral power cord and the appropriate plug for the installing location, provided the appropriate country finish code was used at the time of ordering. The panel mount units are shipped without a power cord since panel installations vary so widely. A terminal strip is used for power connection, providing the flexibility to tie into a power strip or power terminal block wherever it may be located within or outside of the enclosure.

Simple Mounting - The Panel Mount PANTHER® requires only a simple rectangular panel cutout and the drilling of four mounting holes. The Harsh Environment (Desk/Wall) PANTHER uses cord grips for quick cable installation and sealing. The bracket included allows you to place the PANTHER Terminal on a desktop, mount it to a wall or be attached to a Mettler Toledo column.

Terminal Strip Connections - All wiring terminations are made to terminal strips. All connections are clearly marked for load cell, discrete input/output, serial output, and power termination.

Reliability

ISO 9001 Quality - The PANTHER® Terminal was developed, produced, and tested in a Mettler Toledo facility that has been audited and registered according to international ISO 9001 quality standards.

Factory Assembly - The PANTHER® Terminal can be factory assembled to any available combination of standard and optional features. Factory assembled models will be tested as a system, including all internal functions and external I/O, and shipped ready for installation “out of the box.”

Performance Standards - The PANTHER® is designed to meet all international weights and measures and electrical safety standards. It has high immunity to external influences such as radio frequency, electromagnetic interference and static discharge.

Standard Features

PANTHER terminals come with the following standard hardware features:

Hardware Features

- Seven digit numeric vacuum fluorescent display
- Six position keypad
- Screw terminal wiring connectors
- Single board design
  - Zero and tare weight power loss protection
  - Digital Version - Compatible with METTLER TOLEDO DigiTOL Load Cells.
  - Analog Version - Analog load cell input for up to eight 350Ω cells
  - COM1 bi-directional serial port (RS-232)
  - One discrete input
  - Three discrete outputs
  - Option expansion connector
- Optional Analog Output Interface
- Optional Allen-Bradley[1], PROFIBUS[2], and Modbus PLC[3] Interface

Hardware Features Harsh Environment Model (PTHN)

- Sleek fabricated stainless steel enclosure
- NEMA 4X (IP65) protection
- Stainless steel stand for desk or wall mounting
- Power cord (6 feet/2 meters)
- NEMA 4X (IP65) sealable cord grips
- No exterior screws or latches (except for stand mounting)
- Five LEDs for indication of over / under condition or setpoint status

Hardware Features Panel Mount (PTPN)

- Extruded aluminum chassis
- Stainless steel front bezel
- NEMA 4 (IP65) front panel
- Three LEDs for indication of over / under or setpoint status

Software Features

- Scale functions
  - DigiTOL® and Digital J-Box support
  - Analog (powers up to eight 350 Ohm cells) scales supported
  - 300 A/D Updates Per Second
  - 10,000 d display resolution
  - Pushbutton tare and Tare interlock
  - Automatic tare above threshold
  - Automatic clear to gross below threshold

Units switching (lb, kg, g, oz, lb/oz, troy oz, dwt, tons, metric ton)
Automatic zero maintenance
Motion detection and indication
Zero indication in either gross or net mode
TraxDSP™ vibration rejection

- Operator interface
  Consistent and intuitive operator interaction
  Program block setup menu
- Memory functions
  Storage of zero and tare values during power-loss conditions
  Storage of four target weights for use in over/under applications
  Storage of two setpoint values with preact in setpoint applications
- Serial data functions
  Three pre-defined output templates
  Output on demand
  Print from keyboard, remote ASCII command, or discrete input
  Automatic print at setpoint
  Print interlock to prevent duplicate prints
  Continuous data output
  Serial command input
- Discrete I/O functions
  One programmable input
    Print, Tare, Zero, Switch Units
  Three discrete outputs
    Setpoint 1 & 2 Coincidence
    Zero Tolerance
    Over, Under, and Accept criteria

Optional Features

Analog Output. Provides one 16 bit analog output port with user configurable output ranges of 4 to 20 mA, or 0 to 10 VDC plus a status output. Connection is via a terminal strip.

High Level Discrete Output (PM only). Provides high level AC interfacing (28 to 280 VAC) for the standard low level discrete outputs. Up to three output blocks can be installed as part of the panel enclosure. AC connections are made via terminal strips on the back panel. Other versions of output blocks (DC) can be installed to control DC voltages rather than AC voltage.

Allen-Bradley PLC Interface. The optional Allen-Bradley RIO Interface supports Allen-Bradley PLC devices which use the RIO “Blue Hose” Interface.

PROFIBUS PLC Interface. The optional PROFIBUS PLC interface supports TI-505 PLC and Siemens 115 Series PLC interfaces.

Modbus Plus Interface. The optional Modbus Plus interface supports Modicon, Telemechenique, and Square D PLC's through the Modbus Plus network.

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Specifications

The PANTHER Terminal conforms to the specifications listed in this chapter.

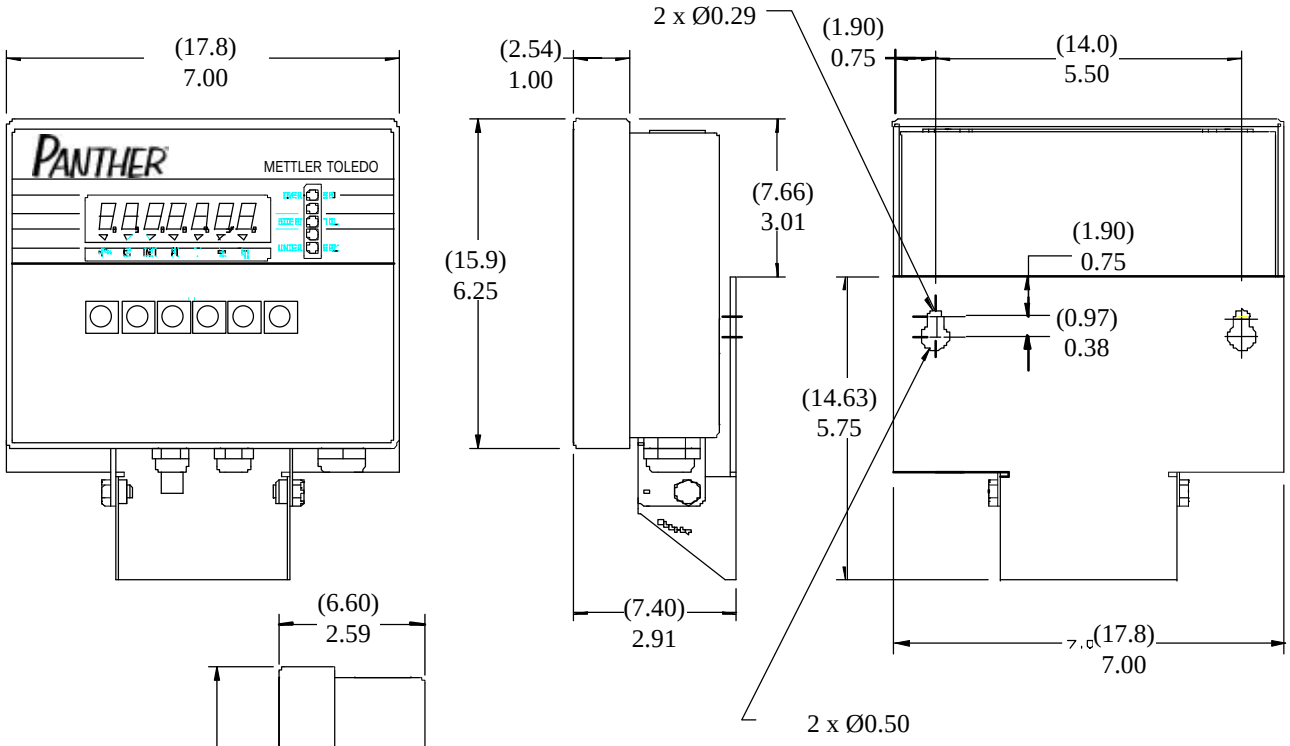
Physical Dimensions

The PANTHER Terminal Harsh Environment model measures:

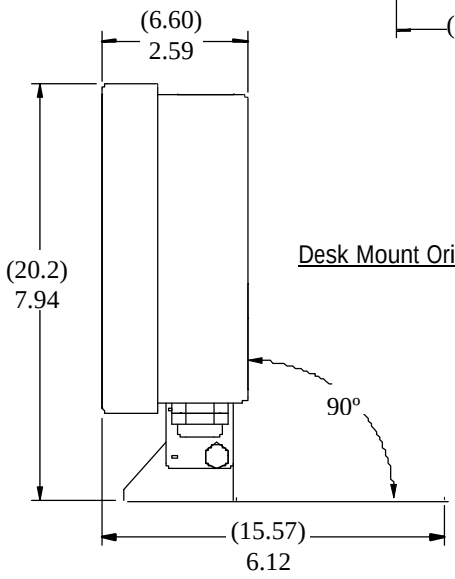
- 6.25 in. (15.9 cm) high × 7.00 in. (17.8 cm) wide at the front of the terminal
- 2.59 in. (6.6 cm) deep

Location of keyholes for wall mounting screws is shown below.

Wall Mount Orientation



Desk Mount Orientation

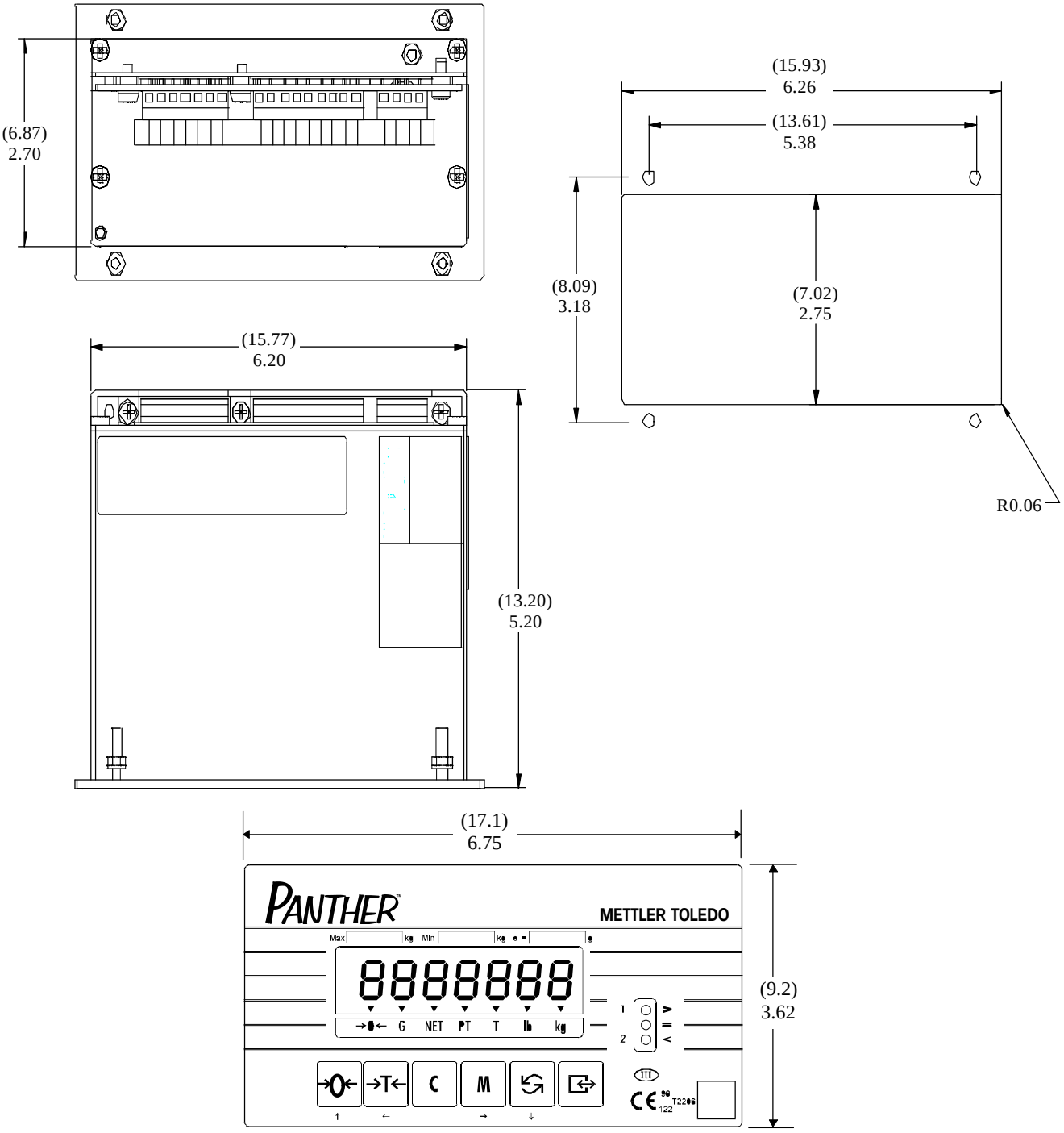


Note: The optional high level optos add 1.25in.(3.17cm) to the depth.

The PANTHER Terminal Panel Mount model measures:

- 3.62 in. (9.2 cm) high × 6.75 in. (17.1 cm) wide at the front
- 5.20 in. (13.2 cm) deep

Refer to the cutout diagram when installing the Panel Mount PANTHER Terminal.



Power Requirements

The PANTHER Terminal is provided with a universal power supply which operates from 85 to 264 VAC. The supply operate with a line frequency of 49 to 63 Hz. Power consumption is 12 Watts maximum. Power is applied through a terminal strip. The power cord is not provided with the panel mount version (PTPN).

The integrity of the power ground for equipment is important for both safety and dependable operation of the PANTHER Terminal and its associated scale base. It is important that equipment does not share power lines with noise generating equipment like heavy load switching, motor starter circuits, RF thermal heaters, inductive loads and the like.

To confirm ground integrity, a commercial branch circuit analyzer like an ICE model SureTest ST-1D (or equivalent) is recommended. This instrument uses a high amperage pulse to check ground resistance. It measures the voltage from the neutral wire to the ground connection and will provide an assessment of the line loading. Instructions with the instrument gives guidelines about limits that assure good connections. Visual inspections and a query of the user will provide information about equipment sharing the power line.

The power line for the PANTHER must not be shared with equipment such as motors, relays, or heaters that generate line noise. If adverse power conditions exist, a dedicated power circuit or power line conditioner may be required.

Controller PCB

The PANTHER Terminal has one discrete input and three discrete outputs (5 Volts DC). Each discrete output can sink up to 20 mA maximum. The maximum current that can be drawn from the +5 Volts DC supply is 15 mA.

The input for PANTHER Terminal is programmable as tare, print, zero, or unit switching. Three outputs are used for setpoint coincidence and zero tolerance, or over, under, or accept indication.

The PANTHER Terminal's COM1 serial port is an RS-232 transmission port. COM1 will also support receipt of an ASCII command set which will cause the indicator to Clear, Tare, Zero, Print or change Units. COM1 can also be configured as an SICS Host Interface port.

Connections to the Controller PCB are made using screw terminal strips. The wire size range for these terminal strips are 24 to 16 AWG.

Display and Keyboard

The PANTHER Terminal Panel Mount model's front panel is made of stainless steel sealed to NEMA 4 (IP65) specifications. The Harsh Environment front panel is fabricated stainless steel, and when locked onto the rear enclosure, is sealed to NEMA 4X (IP65) specifications.

The display is a seven-character, seven-segment, 0.55 in. (12.7 mm) vacuum fluorescent numeric display.

The keyboard consists of a flat membrane switch covered with a domed polyester overlay.

The Panel Mount and Harsh Environment models' lens are polyester. Lenses for both models have hardcoating to resist damage to the lens.

Temperature and Humidity

The PANTHER Terminal operates over a temperature range from 14° to 113 °F (–10 to 45 °C) at 10% to 95% humidity, non-condensing.

Storage temperature range is from –40 to 140 °F (–40 to 60 °C) at 10% to 95% humidity, non-condensing.

Environmental Protection

The Harsh Environment enclosure model meets NEMA 4X (IP65) requirements for a dust-tight and splash-proof enclosure.

The keyboard/display enclosure for the panel mount version meets NEMA 4 (IP65) requirements for dust-tight and splash-proof applications when properly installed in an appropriate enclosure. The rest of the panel mount enclosure meets NEMA 1 (IP30) requirements and provides no protection against dust or water ingress.

Hazardous Areas

The PANTHER Terminal is not intrinsically safe! The PANTHER Terminal is capable of operation with scales and barriers located in a hazardous area. Contact your Authorized METTLER TOLEDO representative for information about hazardous area applications.

⚠ WARNING!

The PANTHER terminal IS NOT intrinsically safe! DO NOT use in areas classified as HAZARDOUS by the National Electric Code (NEC) because of combustible or explosive atmospheres.

Standards Compliance

UL and cUL Listing

The PANTHER Terminal has been tested and comply with UL 1950 and carries the UL and cUL labels.

CSA Certification

The PANTHER Terminal is designed to meet CSA standard C22.2 No 143-1975, Office Machines.

Weights and Measures Approval

USA NTEP COC

The PANTHER Terminal meets or exceeds requirements for Class III or Class IIIL devices. The Certificate of Conformance number 96-125A was issued under the National Type Evaluation Program of the National Conformance of Weights and Measures.

Canada Notice Of Approval

A Notice Of Approval AM-5162 has been issued by Canadian Weights and Measures for the PANTHER Terminal.

Conducted and Radiated Emissions (RFI)

The PANTHER Terminal meets or exceeds FCC docket 80-284 for conducted and radiated emissions requirements as a Class A digital device.

Radio Frequency Interference Susceptibility

The PANTHER Terminal meets USA, Canadian, and EC requirements for RFI susceptibility as listed in the following table with a maximum of one display increment of change when calibrated for recommended builds.

RFI Susceptibility			
	U.S.A.	Canadian	EC
Radio Interference Frequency	Field Strength	Transmitted Power at Specified Distance	Field Strength
27 MHz	3 volts/meter	4 Watts at 2 meters	N/A
144 MHz	N/A	N/A	N/A
169 MHz	3 volts/meter	N/A	N/A
464 MHz	3 volts/meter	4 Watts at 2 meters	N/A
27-1000 MHz	N/A	N/A	3 volts/meter

AC Power Line Voltage Variation

The PANTHER Terminal meets NIST H-44, Canadian Gazette Part 1, and OIML-SP7/SP2 line voltage variation specifications as listed in the following table:

AC Power Line Voltages						
Specification	AC Line Voltage			Line Frequency in Hz		
Line Voltage Variation	Minimum	Nominal	Maximum	Minimum	Nominal	Maximum
NIST H-44	100	120	130	59.5	60	60.5
Canadian	108	120	132	58.8	60	61.2
OIML-SP7/SP2	102 187 204	120 220 240	132 242 264	58.8 49.0 49.0	60 50 50	61.2 51 51

Model Identification

Refer to this chart to identify the model number of the Panther terminal with which you are working or when ordering equipment.

PANTHER TERMINAL MODEL CONFIGURATION EX: PTPN-1800-XXX						
PT	XX	X	X	X	X	XXX
Terminal	Enclosure & Display Type	Scale Type Option	Interface Option	Setpoint Option	Unused	Destination Market
PANTHER Terminal	PN = Panel, numeric display HN = Harsh Environment (Desk/Wall), numeric display	0=None 1=Analog Load Cell 3=DigiTOL Load Cell	0 = None 5=Modbus Plus 6=Allen-Bradley 8=Analog Output (not available when used with more than 4 analog load cells 9=PROFIBUS	0=None 1=3 Opto Setpoint (Panel Only)	Always = 0	000=USA 002=Denmark 003=United Kingdom 004=Italy 005=Switzerland(Ger) 007=Switzerland (Fr) 009=Argentina 010=Australia 011=Austria 014=Belgium 017=Brazil 019=Canada (Eng) 020=Canada (Fr) 022=Chile 023=China 033=Finland 034=France 035=Germany 036=Greece 041=Hong Kong 045=Indonesia 046=Ireland 050=Japan 053=Malaysia 054=Mexico 056=Netherlands 057=New Zealand 059=Norway 062=Paraguay 063=Peru 064=Phillippines 066=Portugal 067=Puerto Rico 069=Russia 071=Singapore 075=Spain 076=Sweden 077=Taiwan 078=Thailand 082=Uruguay

Enclosures

Harsh Enclosure (HN). This enclosure provides NEMA 4X (IP65) protection. A keyboard and display are standard. The enclosure is a fabricated stainless steel box with a removable cover. The unit is designed to sit on a flat surface or can be mounted to a wall or to Mettler Toledo columns. The bottom of the enclosure contains grip bushings to seal all cables entering the enclosure.

Panel Enclosure (PN). This enclosure is designed to be mounted into a panel. Four threaded studs are used to mount the unit through a flat panel. The front panel and associated panel clamping mechanism are designed to provide a NEMA 4 (IP65) seal and accommodate a panel thickness from 16 to 11 gauge.

Numeric Display. The PANTHER contains a seven-character, 0.55 in. (12.7 mm) high vacuum fluorescent display with a domed keyboard on a stainless steel front housing. It can indicate weight values in standard use or display recalled information, errors, and other messages. Each digit has a decimal point/comma and an annunciator. The annunciators indicate gross or net weights, center of zero, and weight units. The universal keyboard has symbols for Memory, Tare, Select, Clear, Zero, Enter/Print, and Function. These keys allow access to operator prompting, setup, and other functions.

The harsh enclosure version includes five multi-colored LEDs used to indicate over or under tolerance conditions for manual checkweighing applications. In setpoint applications, these LEDs indicate the status of the individual setpoints. The panel mount version includes three LEDs which indicate similar conditions.

Accessories

Analog Output. The PANTHER Terminal offers an optional Analog Output port for output ranges of 4 to 20 mA or 0 to 10 VDC, plus a status indicator. This output uses a 16 bit D/A converter for a very precise output. The output status is an optically isolated, open collector type with a 30 volt maximum limit. The Analog option can be installed in either enclosure style, but is not available when the PANTHER Terminal is used with more than four analog load cells.

High Level Discrete Output. The High Level Discrete Output option provides high level AC interfacing (28 to 280 VAC) for use with the standard low level discrete outputs. Three output blocks can be installed on the rear of the panel enclosure. AC connections are made via terminal strips on the rear panel. Other versions of output blocks can be installed to control DC voltage rather than AC voltage. The high level discrete output is available only for the panel enclosure.

Allen-Bradley™ PLC Connectivity. An option is available for the PANTHER Terminal to enable the terminal to operate as a standard A-B PLC remote I/O device. Integration of a PANTHER Terminal with an A-B PLC system is as simple as making the “blue hose” connection and communicating with the terminals directly from your PLC program.

PROFIBUS™ Connectivity. The PROFIBUS interface module directly interfaces with PROFIBUS devices such as PLCs manufactured by Siemens and Texas Instruments. This direct connection allows for transfer of scale-related

information to controlling devices at speeds up to 12 Mbaud. The PANTHER Terminal is an L2-DP device, fully certified by the PROFIBUS Test Center.

Modbus™ Plus Connectivity. The Modbus™ Plus interface allows interfacing to a Modbus Plus network. Modbus Plus is a local area network designed for industrial control applications. It enables Modicon Model 984 programmable controllers, host computers, Jaguars, PANTHER Terminals, and other devices to communicate throughout the production areas of an industrial plant. It supports 64 addressable node devices at a data transfer rate of 1 Mbaud. Up to 32 devices can connect directly to a network cable with a length up to1500 feet.

Capacity and Increment Size

Scale Capacity and Increment Size are selected during set up from the selections in the following tables, which also show the resulting full scale increments.

Increment Size	LOAD CELL SCALE CAPACITIES							
	1000d	2000d	3000d	4000d	5000d	6000d	8000d	10000d
0.001	1	2	3	4	5	6	8	10
0.002	2	4	6	8	10	12	16	20
0.005	5	10	15	20	25	30	40	50
0.01	10	20	30	40	50	60	80	100
0.02	20	40	60	80	100	120	160	200
0.05	50	100	150	200	250	300	400	500
0.1	100	200	300	400	500	600	800	1000
0.2	200	400	600	800	1000	1200	1600	2000
0.5	500	1000	1500	2000	2500	3000	4000	5000
1	1000	2000	3000	4000	5000	6000	8000	10000
2	2000	4000	6000	8000	10000	12000	16000	20000
5	5000	10000	15000	20000	25000	30000	40000	50000
10	10000	20000	30000	40000	50000	60000	80000	100000
20	20000	40000	60000	80000	100000	120000	160000	200000
50	50000	100000	150000	200000	250000	300000	400000	500000

Capacity (lb oz)	Increment (oz)	Calibration Capacity (oz)	# div
7 lb 8.00 oz	0.02	120	6000
9 lb 6.00 oz	0.05	150	3000
18 lb 12.00 oz	0.05	300	6000
18 lb 12.0 oz	0.1	300	3000
25 lb 0.0 oz	0.1	400	4000
37 lb 8.0 oz	0.1	600	6000
37 lb 8.0 oz	0.2	600	3000
50 lb 0.0 oz	0.2	800	4000
75 lb 0.0 oz	0.2	1200	6000
93 lb 12.0 oz	0.5	1500	3000
187 lb 8 oz	1	3000	3000
375 lb 0 oz	2	6000	3000
750 lb 0 oz	4	12000	3000

2 Installation

Please read this chapter thoroughly before you begin installation.

Environment

Identify the best location for the equipment. The proper environment enhances the operation and longevity of your PANTHER Terminal. Choose a favorable location for the PANTHER Terminal based on the environmental specifications listed in Chapter 1.

Unpacking

If the shipping container is damaged upon receipt, check for internal damage and file a freight claim with the carrier if necessary.

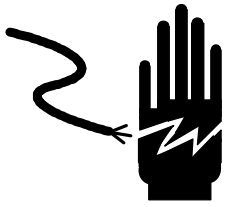
If the container is undamaged, remove the PANTHER Terminal from its protective package and inspect each component for damage. If it is necessary to ship the terminal, use the original shipping container if possible. Verify whether your PANTHER Terminal is setup for analog or DigiTOL load cells. The fifth character of the product ID on the serial tag will indicate whether the unit is analog or DigiTOL (1=analog, 3=DigiTOL). Always verify the type of load cell interface before any connections are made.

Package contents for all PANTHER Terminal units include:

- PANTHER Terminal Indicator
- Quality Feedback Card
- Security Seal
- Capacity Sheet Labels
- Cursor Legends Labels
- Address Labels
- Operator Manual

Warnings and Precautions

Please observe the following warnings and precautions as you install the PANTHER Terminal and make all necessary electrical connections.



⚠ WARNING

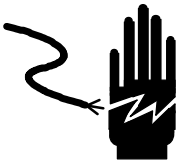
ONLY PERMIT QUALIFIED PERSONNEL TO SERVICE THIS EQUIPMENT. EXERCISE CARE WHEN MAKING CHECKS, TESTS AND ADJUSTMENTS THAT MUST BE MADE WITH POWER ON. FAILING TO OBSERVE THESE PRECAUTIONS

	CAN RESULT IN BODILY HARM.

CAUTION

OBSERVE PRECAUTIONS FOR HANDLING ELECTROSTATIC SENSITIVE DEVICES.

Opening the Harsh Environment Model



WARNING

DISCONNECT ALL POWER TO THIS UNIT BEFORE INSTALLING, SERVICING, CLEANING, OR REMOVING THE FUSE. FAILURE TO DO SO COULD RESULT IN BODILY HARM AND/OR PROPERTY DAMAGE.

The PANTHER Harsh Environment model uses four spring clips to lock the front panel in place and seal the enclosure to NEMA 4X specifications. These clips are attached to the enclosure body. To access the Controller PCB for internal wiring and setting switches:

- Separate the front panel from the enclosure.
- Insert the tip of a flat-blade screwdriver into one of the three slots located on the bottom of the front panel assembly and gently push in toward the enclosure. You should hear a quiet “pop” when the cover has been released.
- Push in on the side of the slot closest to the bottom of the cover.
- Repeat for the other slots.
- After releasing the front panel, lift the bottom of the front panel out until it completely clears the enclosure.
- Squeeze the top of the front panel to the enclosure slightly and raise it to clear the two top clips. The cover will swing down hinged by a wire cable at the bottom. Figure 2-1 shows the location of the slots (A).

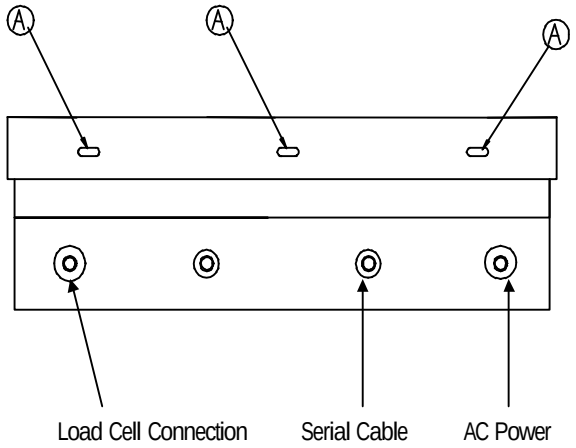


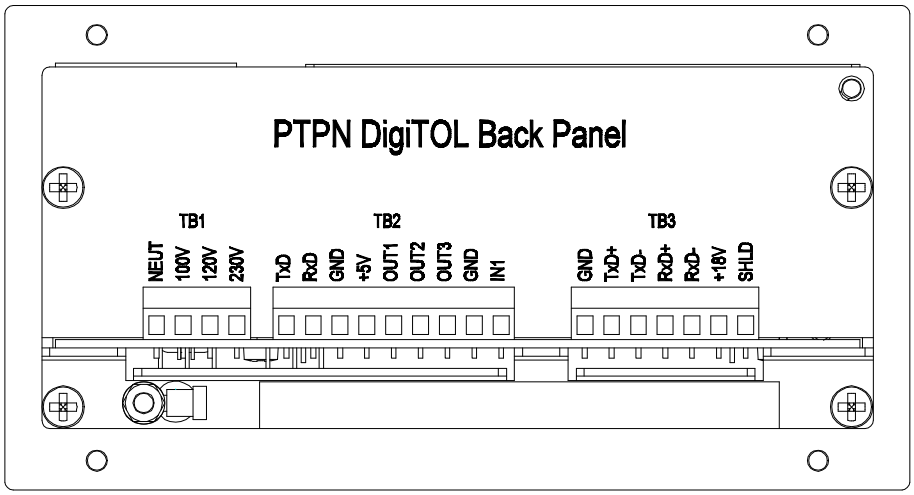
Figure 2-1

To connect the unit:

- Pass the cables that enter the enclosure through an appropriately sized cable grip before connecting the wires.
- Tighten the cable grip sufficiently to provide a water-tight seal around the cable only after re-securing the back cover. This will allow any internal cable slack to be received through the cable grip.

Opening the Panel Mount Model

The PANTHER Panel Mount Model uses an exposed terminal access design. All connections are made at the back of the indicator on the controller PCB (See Figure 2-2). If access to inside the unit is necessary, remove the two screws holding the cover plate at the rear of the unit and lift the cover plate over the terminal strips.



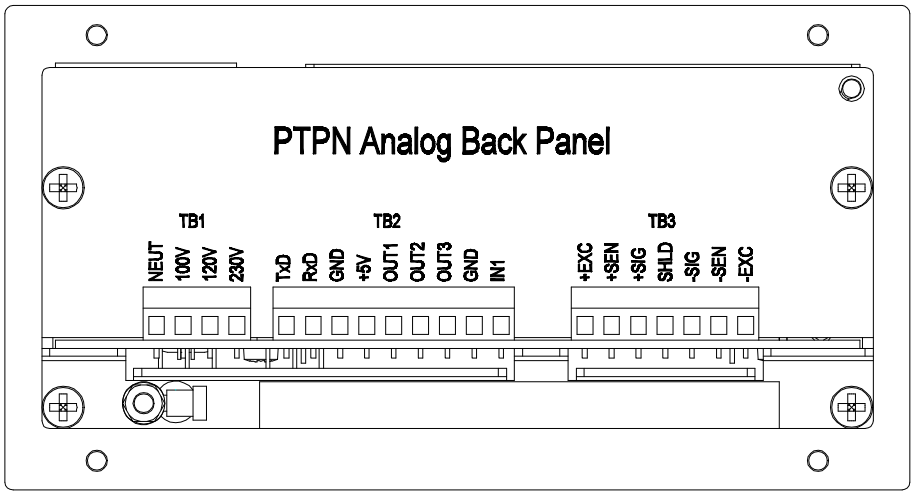
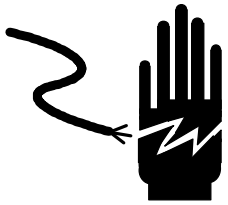


Figure 2-2

Electrical Connections

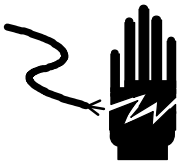
After the Harsh Environment PANTHER Terminal is opened or the Panel Mount model is installed, you can make the electrical connections.



⚠ WARNING

ONLY PERMIT 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.

AC Power



⚠ WARNING

DISCONNECT ALL POWER TO THIS UNIT BEFORE INSTALLING, SERVICING, CLEANING, OR REMOVING THE FUSE. FAILURE TO DO SO COULD RESULT IN BODILY HARM AND/OR PROPERTY DAMAGE.

The PANTHER Terminal Harsh Environment (HN model) is shipped with an integral power cord. The appropriate country finish code determines which power cord is installed. The Panel Mount (PN model) is shipped without a power cord, since panel installations vary. AC wiring to the HN and PN is shown below.

PANTHER Harsh Environment (PTHN) AC Power Cord Wiring

The HN models are shipped with the power cord installed. For reference, the wiring to the HN model using the standard Mettler Toledo Power Cord is as follows:

Power Cord	Color Code
Line (Hot)	Brown
Neutral	Blue
Ground (Chassis)	Green/Yellow

PANTHER Panel Mount (PTPN) AC Power Wiring to TB1

No power cord is shipped with the PN models. Wiring to terminal strip TB3 on the rear of the PANTHER is shown below. Ground is connected to the chassis ground.

TB1 Pin #	AC Power Input
1	Neutral
2	100 VAC
3	120 VAC
4	230 VAC

Connect the Load Cell

Disconnect the AC power to the PANTHER Terminal. Make the appropriate load cell connection to the Controller PCB for load cells.

CAUTION

To avoid damage to the PCB or load cell, remove power from the PANTHER Terminal and wait at least 30 seconds before connecting or disconnecting any harness.

Analog Load Cell Connections

The maximum cable length for analog load cell connections to the PANTHER Terminal depends on the total scale resistance (TSR) of the scale base. To calculate TSR:

$$TSR = \frac{\text{Load Cell Input Resistance (Ohms)}}{\text{Number of Load Cells}}$$

The chart below gives recommended cable lengths based on TSR and cable gauge. The PANTHER Terminal can power up to eight 350 Ohm analog load cells.

Recommended Maximum Cable Length			
TSR (Ohms)	24 Gauge (feet)	20 Gauge (feet)	16 Gauge (feet)
350	800	2000	4000
87	200	600	1000
45	100	300	500

Once the length of the cable is determined, connect to TB3 of the PANTHER Terminal Controller PCB. The pinout for TB3 is labeled on the Controller PCB.

The following diagrams describe the PANTHER Terminal analog load cell terminal strip TB3 wiring for standard 6-wire cable, Masstron 6-wire cable, and standard 4-wire cable.

PANTHER Terminal TB3
Standard 6-wire Cable

-EXC	7	ÄÄÄÄÄÄÄÄÄÄ	Blue
-SEN	6	ÄÄÄÄÄÄÄÄÄÄ	Red
-SIG	5	ÄÄÄÄÄÄÄÄÄÄ	Black
Shield	4	ÄÄÄÄÄÄÄÄÄÄ	Orange
+SIG	3	ÄÄÄÄÄÄÄÄÄÄ	Green
+SEN	2	ÄÄÄÄÄÄÄÄÄÄ	Yellow
+EXC	1	ÄÄÄÄÄÄÄÄÄÄ	White

PANTHER Terminal TB3
Masstron 6-wire Cable

-EXC	7	ÄÄÄÄÄÄÄÄÄÄÄÄ	Black
-SEN	6	ÄÄÄÄÄÄÄÄÄÄÄÄ	Blue
-SIG	5	ÄÄÄÄÄÄÄÄÄÄÄÄ	Red
Shield	4	ÄÄÄÄÄÄÄÄÄÄÄÄ	Yellow
+SIG	3	ÄÄÄÄÄÄÄÄÄÄÄÄ	White
+SEN	2	ÄÄÄÄÄÄÄÄÄÄÄÄ	Brown
+EXC	1	ÄÄÄÄÄÄÄÄÄÄÄÄ	Green

PANTHER Terminal TB3
4-wire Cable

-EXC	7	ÄÄÄÄÄÄÄÄ ÄÄ	Black
-SEN	6	ÄÄÄÄÄÄÄÄ	
-SIG	5	ÄÄÄÄÄÄÄÄÄÄÄÄ	Red*
Shield	4	ÄÄÄÄÄÄÄÄÄÄÄÄ	Yellow or Orange
+SIG	3	ÄÄÄÄÄÄÄÄÄÄÄÄ	White*
+SEN	2	ÄÄÄÄÄÄÄÄ ÄÄ	Green
+EXC	1	ÄÄÄÄÄÄÄÄ	

*If an increase in load results in a decrease in weight display, reverse the signal wires (+SIG and –SIG).

Minimum Increment Size for Analog Scale Input

The minimum increment size selection for an analog scale input is determined by calculating the microvolts per increment for the desired build.

To calculate the microvolts per increment, solve the following equation for µV per increment.

$$\mu V \text{ per Increment} = \frac{\text{Increment Size} \times \text{cell output} \times 5000}{\text{Load Cell Capacity} \times \text{Ratio}}$$

The increment size, scale capacity, and load cell capacity must all be measured in the same weight units, lb or kg. If the weight units for any of these variables are listed in kg units, multiply by 2.2046 to convert to lb units for the purposes of this calculation.

Load cell output is rated in mV/V (millivolts per volt of excitation), marked on load cell data tag. Mettler Toledo load cells are typically 2 mV/V. Other load cells can range from 1 mV/V to 4.5 mV/V.

The load cell capacity is the rated capacity marked on load cell data tag. The ratio is the total number of load cells in the system or the total lever ratio (if scale is a mechanical lever system conversion).

Sample Calculation

1. Refer to the following example of µV per increment calculation for a Model 2158 floor scale installation.

Scale Capacity	5000 lb
Increment Size	1.0 lb
Load Cell Capacity	2500 lb
Number of Cells	4
Cell Output	2 mV/V
Excitation Voltage	5 VDC

2. Use the following formula to calculate the µV per increment:

$$\mu V \text{ per Increment} = \frac{\text{Increment Size} \times \text{cell output} \times \text{excitation (mV)}}{\text{Load Cell Capacity} \times \text{Ratio}}$$

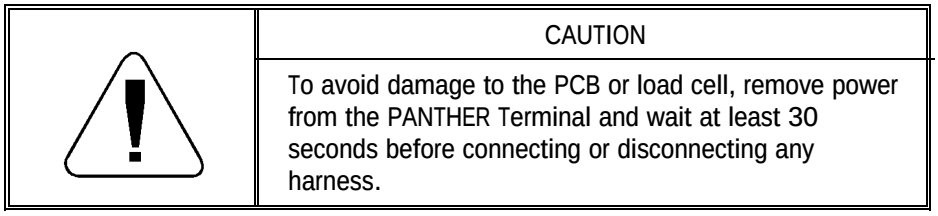
Substituting the 2158 parameters in the formula:

$$\mu V \text{ per Increment} = \frac{1.0 \text{ lb} \times 2 \text{ mV / V} \times 5000}{2500 \text{ lb} \times 4 \text{ load cells}} = 1.0 \mu V/\text{inc.}$$

The PANTHER Terminal is approved as legal-for-trade at a minimum of 1 µV per increment. Acceptable weighing performance for non-legal-for-trade applications can be obtained when a minimum of 0.6 µV per increment is provided. At full scale, the maximum load cell output may not exceed 10 mV in the 2 mV/V jumper position or 15 mV in the 3 mV/V jumper position.

UltraRes and DigiTOL® Load Cell Connections

The fifth character of the product ID on the serial tag will indicate whether the unit is analog or DigiTOL® (1=Analog, 3=DigiTOL). For example, PTHN3000-000 is a harsh environment PANTHER Terminal setup for DigiTOL. Always verify the type of load cell interface before any connections are made and disconnect power to the PANTHER Terminal before connecting or disconnecting any UltraRes or DigiTOL® bases. The maximum cable length for all DigiTOL® bases is 50 feet.



Connect UltraRes or DigiTOL® Bases to the PANTHER Terminal as follows:

UltraRes or DigiTOL® B/P Base		Color Code	PANTHER Terminal TB3	
Ground	7	Blue	1	Ground
RxD A	1	Red	2	TxD+
Batt In	4	White	3	TxD-
TxD A	8	Black	4	RxD+
TxD B	6	Yellow	5	RxD-
+20 VDC	5	Green	6	+18 VDC
		Orange	7	Shield

Enhanced DigiTOL J-Box Connections

The maximum cable length for the Enhanced DigiTOL J-Box is 300 feet. The following diagram illustrates load cell terminal strip wiring to the J-Box.

Enhanced DigiTOL® J-Box		Color Code	PANTHER Terminal TB3	
GND (TB2)	7	Blue	1	Ground
RxD A (TB1)	1	Red	2	TxD+
Batt In (TB1)	4	White	3	TxD-
TxD A (TB1)	8	Black	4	RxD+
TxD B (TB1)	6	Yellow	5	RxD-
+20 VDC (TB2)	5	Green	6	+18 VDC
		Orange	7	Shield

Main PCB Serial Port

COM1 RS-232

The receiver of COM1 may be used to accept simple serial commands. The commands are the common functions of the front panel push buttons, including:

C	Clear
T	Tare
Z	Zero
P	Print
S	Send (same as print)
U	Switch Units

All other ASCII characters are ignored, which permits the use of termination characters following the command such as <CR> or <LF>.

The following diagram and table describe The PANTHER Terminal's terminal block TB2 COM1 pin-to-pin cable connections using an RS-232 cable. The maximum recommended cable length for RS-232 communications is 50 feet.

PANTHER Terminal TB2 COM1		
1	TXD	RS-232 Transmit
2	RXD	RS-232 Receive
3	GND	Signal Ground

Pin Connection for Mettler Toledo Devices Using COM1 RS-232				
PANTHER Terminal TB2 COM1	8806 8807 8845	8855 8856 8860	8861 8865 MP750	8617-TB2 9323-TB2 9325-TB2
TXD	3*			2
RXD	—			—
GND	7*			3

*Each of these devices uses this connection.

Main PCB Discrete Wiring

Discrete port (PAR1) terminal block assignments. All parallel port outputs are TTL Level, 5 VDC maximum. All discrete port inputs levels are $V_{IN\ LOW}$ = 0.0 - 0.8 VDC,
$V_{IN\ HIGH}$ = 3.5 - 5.0 VDC.

TB2

4	+5 VDC, current limited to 15 mA
5	OUT1
6	OUT2
7	OUT3
8	GND
9	IN1

Setpoint Output Option

The Setpoint Output Option converts logic level outputs available at the Controller PCB terminal strip into high level AC outputs. Electrical support is provided for optional use of contact output modules (supplied by others). Setpoint Output Option is usable only in Panel Mount PANTHER versions. It consists of a PCB mounted on the rear of the panel mount enclosure, which replaces the usual rear cover plate. Connections are made between the Controller PCB and the Setpoint Output Option PCB using discrete wires between the Controller PCB terminal strip and a dual 5 pin connector on the Setpoint Output PCB. Each output module is individually fused (located on the module), and is rated at 1A, 28-280 VAC, 50/60 Hz. Alternate output modules (e.g. for DC switching) may be substituted. Field wiring for the outputs is provided by terminal strips on the option PCB.

Overall dimensions: 53 mm wide x 152 mm deep (2.12" x 6.2")

Power consumption: 15 mA @ 5 VDC

External Field Wiring terminal strip assignments:

TB1-1 AC Output 1 (fused)
TB1-2 AC Output 1
TB2-1 AC Output 2 (fused)
TB2-2 AC Output 2
TB3-1 AC Output 3 (fused)
TB3-2 AC Output 3

Logic Level Wiring J1

1, 2 GND
3, 4 OUT3
5, 6 OUT2
7, 8 OUT1
9, 10 +5 VDC

PANTHER Terminal Main PCB Switches, Jumpers, Fuse

Switches and jumpers on the PANTHER Terminal Main PCB should be set as described below. Refer to Figure 2-3 and 2-4 for Switch SW1, Fuse F1, and Jumper W1 locations.

Switch SW1

1 Setup/Calibration Enable = On

Normal Operation = Off

2 Display Comma Tail = On

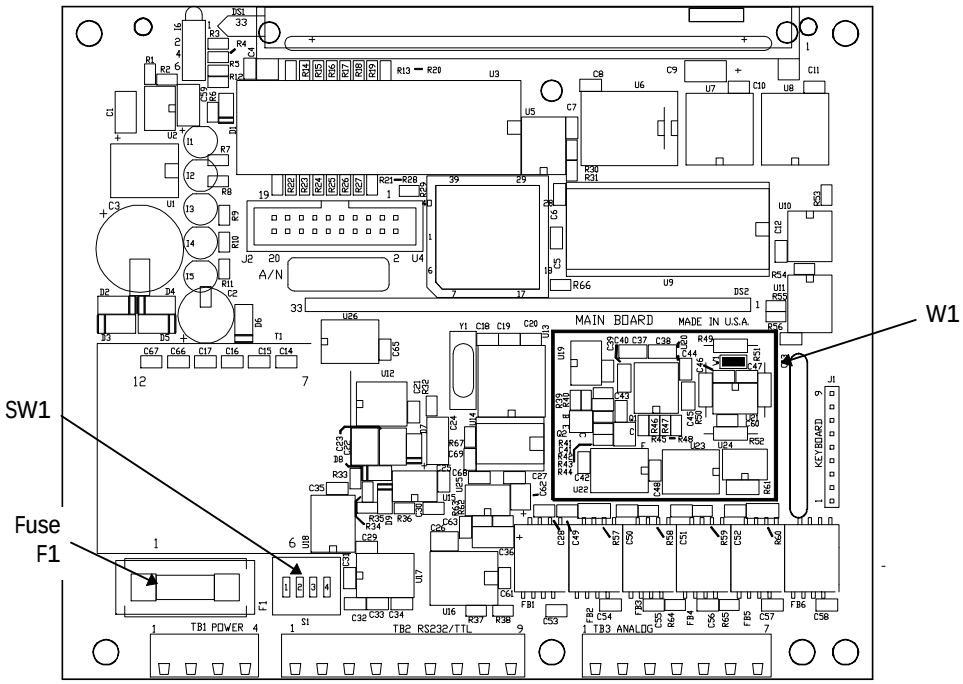
3 Not Used (Must be Off)

4 Test Mode (Must be Off)

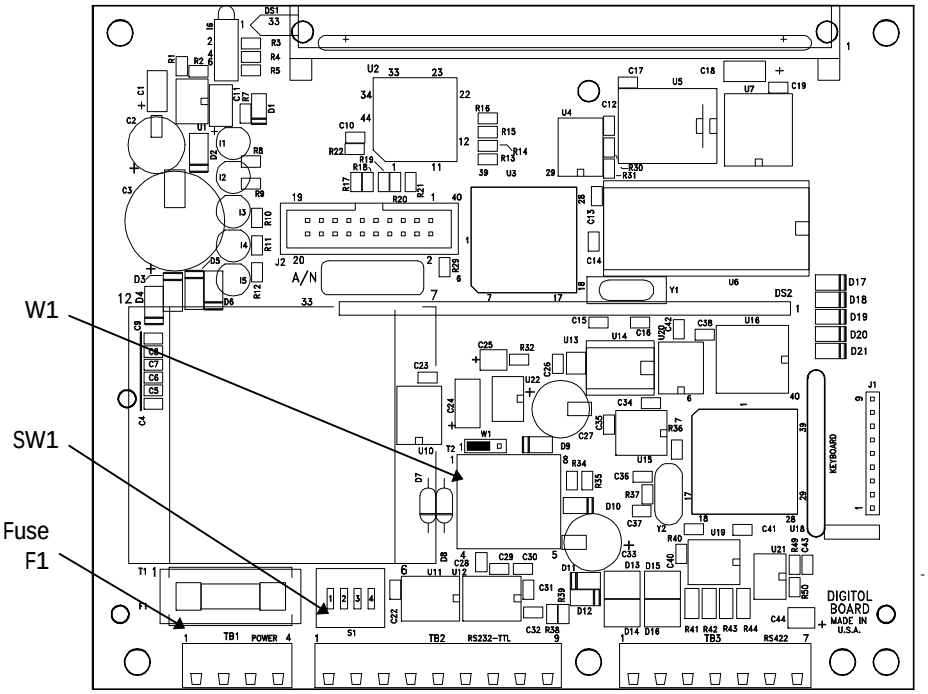
Jumper W1 (Analog Version)

Installed = 2 mV/V Load Cells

Not Installed = 3 mV/V Load Cells



Main PCB Analog Versions (P/N *14865400A or *14865200A)
Figure 2-3



Main PCB DigiTOL® Versions (P/N *15031800A or *14977900A)
Figure 2-4

Allen-Bradley RIO

Wiring

The Allen-Bradley RIO network interface terminal strip is wired as follows:

Electrical: centered, transformer isolated line drivers
Connector: Three position removable terminal strip

1 Blue
2 Shield
3 Clear

PROFIBUS

Wiring

The PROFIBUS connection is available at two locations on the PROFIBUS PCB. The first is a female 9 pin D subminiature connector, which is the PROFIBUS standard connection. The field connector assembly is not supplied by Mettler Toledo. This connection is the preferred connection in PANTHER Terminal Panel Mount (PTPN).

For the PANTHER Terminal Harsh Environment (PTHN), the pluggable terminal strip must be used. In these cases, a pigtail harness is available to wire from the terminal strip to a female 9-pin D connector.

Female DE-9	1 GND (isolated)
	2 N.C.
	3 TX/RX+
	4 RTS
	5 GND (isolated)
	6 +5V (isolated)
	7 N.C.
	8 TX/RX-
	9 N.C.
Terminal strip	1 RTS
	2 TXD/RXD+
	3 TXD/RXD-
	4 +5 V (isolated)
	5 GND (isolated)

PROFIBUS Pigtail Harness Wiring

The PROFIBUS Pigtail Adapter 0900-0311 is wired to the terminal strip as follows:

Color	Terminal Number	Signal
Yellow	1	RTS
Blue	2	COM A
Green	3	COM B
Red	4	+5VDC
Black	5	GND
Green	Chassis Gnd	

0900-0311 Adapter to Terminal Strip Wiring

Modbus Plus

Switch Settings

Each node on the Modbus Plus network must have a unique address. The PANTHER Terminal Modbus Plus node address is set with the “dip switches” on the Modbus Plus interface card. The node address value of the card is equal to the value of the switches plus 1 and it can be equal to a value of 1 to 64.

Switch pos.	1	2	3	4	5	6
value	1	2	4	8	16	32

With the switch in the OFF position, the value is as shown above. With the switch in the ON position, the value is zero for that switch.

Example: SW1 = OFF	Switch Value =	1
SW2 = ON		0
SW3 = ON		0
SW4 = OFF		8
SW5 = OFF		16
SW6 = ON		0
	(PLUS 1)	+1
	NODE ADDRESS =	26

NOTE: With all of the switches in the OFF position, the node address equals 1.

Wiring

The Modbus Plus network uses pins 1, 2, and 3 of the DE-9 connector, supplied by Modicon. Wiring instructions come with the connector. The 0900-0320 Modbus Plus Pigtail Adapter is wired to the PANTHER Terminal as follows:

Color	Terminal Strip #	DE-9
Red	1	1
Clear	2	2
Black	3	3

0900-0320 Adapter to Terminal Strip Wiring

Analog Output

This section covers switches and wiring for the Analog Output Option. The Analog Output terminal strip is shown in Figure 2-5.

Analog Output Terminal Strip

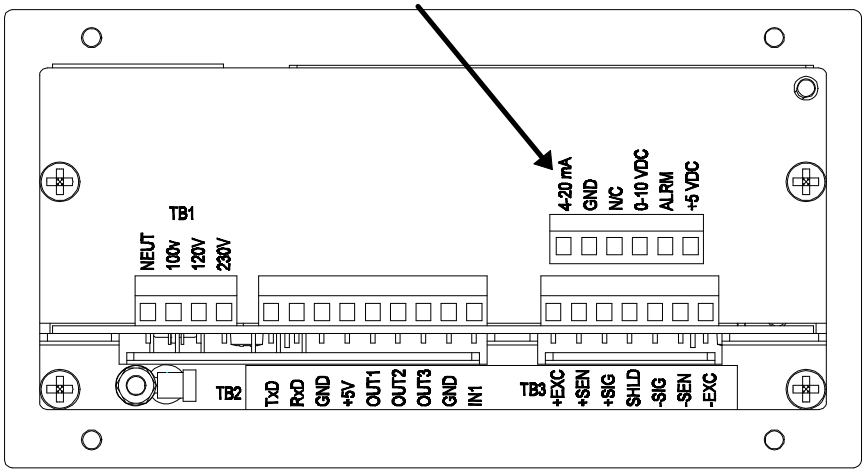


Figure 2-5: PTPN Rear Panel

Wiring

The maximum recommended cable length for the 0-10VDC output is 50 feet (15.2 meters). The recommended cable for use with the analog output is shielded 2-conductor stranded 20 gauge cable (Belden #8762 or equivalent) which is available from Mettler Toledo using part number 510220190.

WARNING!

Do not apply power to the Panther until installation of components and external wiring have been completed. Failure to observe this precaution could result in bodily injury.

4 to 20mA PANTHER Terminal		Customer Device (4-20mA)
4-20mA	———	+
GND	———	-
N.C.		
0-10 VDC		
ALRM*		
+5 VDC		

WARNING!

If this device is used in an automatic or manual filling cycle, all users must provide a hard wired emergency stop circuit outside the device circuitry. Failure to observe this precaution could result in bodily injury.

0 to 10 VDC PANTHER Terminal		Customer Device (0-10VDC)
4-20mA		
GND	———	-
N.C		
0-10 VDC	———	+
ALRM*		
+5 VDC		

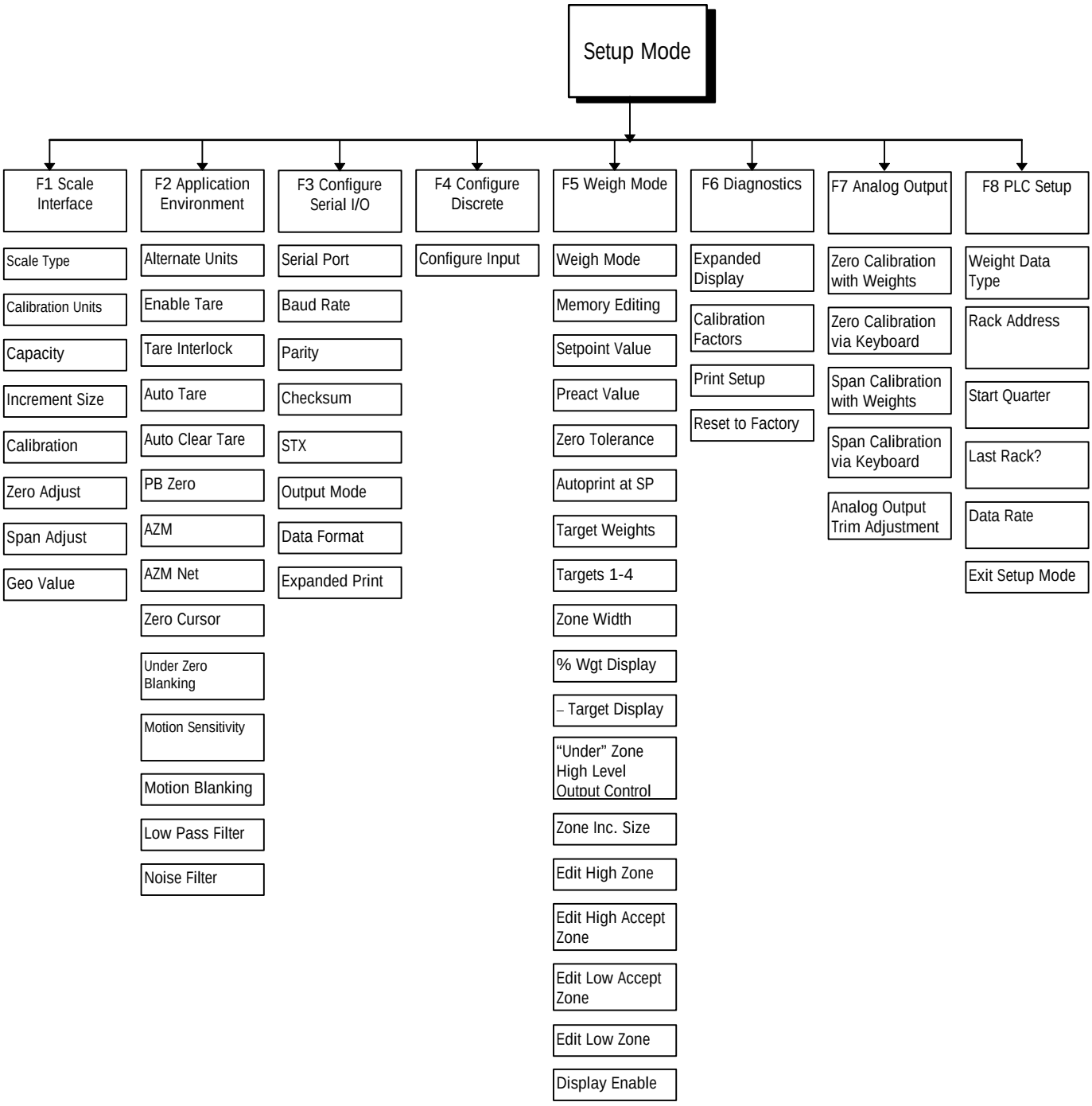
- The ALRM Output (Alarm) is a normally open connection to the GND Terminal during normal operation. If the PANTHER Terminal weight display goes to an over capacity or under zero display, or Setup is entered, the connection closes and the ALRM Output will be capable of sinking up to 30 mA DC. The voltage source can be the +5V supplied with the Analog Output PCB or a maximum of +30 VDC external source.

NOTES

3

Programming and Configuration

The Panther operating functionality is determined by how you configure individual parameters of "program blocks" in setup mode. This chapter discusses basic features of program blocks and how to configure the specific parameters ("sub-blocks") of each. The following diagram gives an overview of the program blocks and sub-blocks:



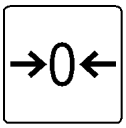
General Information

The Panther setup parameters are divided into seven program blocks. Each program block is divided into sub-blocks where you select and configure individual operating parameters. This chapter describes each program block and sub-block in detail. You should read through this chapter and configure each parameter before you begin using the Panther indicator.

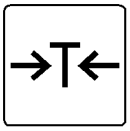
The Panther program blocks use several standard conventions. This section gives general information on keystroke functions, navigation procedures, and program block access and exit.

Keystroke Functions

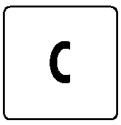
The following keys are used to configure the program blocks.



ZERO Backup to the previous step.



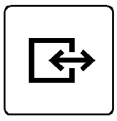
TARE Moves the blinking edit cursor left one digit.



CLEAR resets a numeric data entry value to zero and/or allows programmer to skip to the end of setup.

MEMORY moves the blinking edit cursor right one digit.

SELECT increments the numeric data entry digit and/or allows the programmer to view the next in a selection list.



ENTER Accepts/terminates a data entry.

Program Block Access

Note: the setup switch can remain closed if terminal security is not required.

In order to configure the program blocks the programmer must enter the setup mode. Open the Panther terminal as described in chapter two of this manual and close SW1-1. Close the terminal and press the ENTER and ZERO keys simultaneously.

General Programming Procedure

After accessing the setup mode, each program block and sub-block can be configured according to the procedure outlined in the following pages. If the Panther terminal is being configured for the first time it is recommended that the programmer configure each program block to assure the terminal is setup correctly as the application and/or environment dictates.

Once the F1 prompt is displayed the SELECT key will skip to the next block and the ENTER key will enter the block.

Once ENTER is pressed the Panther advances to the first parameter in the block. The display shows the sub-block number and the current value setting. Press ENTER to accept the value and advance to the next sub-block or press the SELECT key to toggle through the choices until the desired selection is displayed. After the desired selection is displayed press the ENTER key to accept the value. Continue this procedure throughout the setup routine until all changes required have been made.

Program Block Exit

To exit setup press the CLEAR key to advance to the CALOFF display. Next, press the ENTER key. The Panther terminal will exit setup and return to the normal operation mode. At this point, the switch S1-1 can be turned off to secure the terminal.

The following sections describe each program block.

Default Settings

The following is a list of the factory default setup parameters in the Panther Terminal.

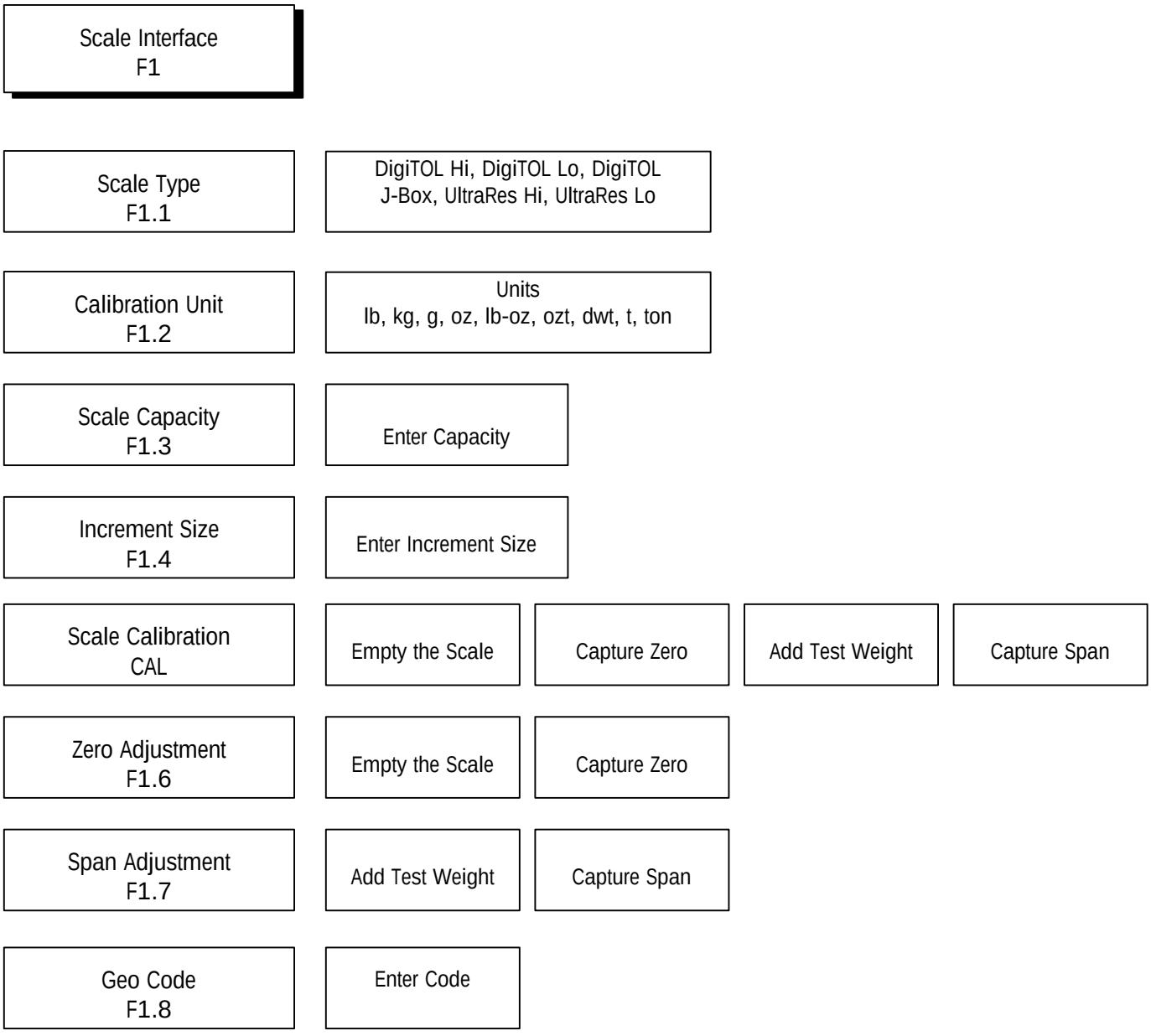
	State	DESCRIPTION
F1.1	2	Scale Type (DigiTOL version Only)
F1.2	1	Calibration units = lb
F1.3	100	Scale Capacity
F1.4	0.01	Scale increment size
F1.6		Zero adjust, no default
F1.7		Span adjust, no default
F1.8	16	Geo Code
F2.1	0	Alternate units = none (unit switching disabled)
F2.3.1	1	Tare enabled
F2.3.2	0	Tare interlock disabled
F2.3.3	0	Auto tare disabled
F2.3.4	0	Auto clear tare disabled
F2.4.1	1	Push button zero enabled, 2% range

F2.4.2	1	Auto zero maintenance enabled within 0.5 d window.
F2.4.3	0	Auto Zero Maint in net mode disabled
F2.4.4	1	Zero cursor enabled
F2.4.5	0	No under zero blanking
F2.5	1	Motion sensitivity ± 0.5 increments.
F2.5.1	0	Blanking Disabled
F2.6	2.0	Filter corner frequency
F2.6.1	0	Noise filter disabled
F3.1	1	COM1
F3.1.1	9600	baud
F3.1.4	2	even parity
F3.1.5	0	Checksum disabled
F3.1.6	0	STX disabled
F3.2	1	Demand output
F3.2.1	0	Print format = displayed weight only
F3.2.2	0	No expanded print
F4.1	1	Discrete input = Print command
F5.1	0	Indicator weighing mode
F5.2	1	Setpoints/Targets editing Memory key
SP1	0	Setpoint 1/Target 1
SP2	0	Setpoint 2/Target 2
SP3	0	Target 3
SP4	0	Target 3
P1	0	No preact for setpoint 1.
P2	0	No preact for setpoint 2.
F5.4	0	No zero tolerance
F5.5	0	No print at setpoint 1 coincidence
F5.6	0	No print at setpoint 2 coincidence
F5.7	0	Stored Target Weight Disabled (only appears if F5.1 = 2)
F5.7.1	0	Zone Weight Entered in Increments
F5.7.2	0	Display is in Weight Units
F5.7.3	0	Disable Weight Difference from Target
F5.7.4	0	Output always on when weight is in “under” zone
F5.8.1	0	High Zone Width
F5.8.2	0	High Accept Zone Width
F5.8.3	0	Low Accept Zone Width
F5.8.4	0	Low Zone Width
F5.9	1	Enable Weight Display and Status Lights

F6.1	0	No expanded display mode
F6.2		Edit Cal. Factors, no default
F6.4		Print Setup, no default
F6.5		Reset to Factory, no default
F7.2 default		Analog Output Zero Calibration with Test Weights, no
F7.2.1		Analog Output Zero Calibration via Keyboard, no default
F7.3 default		Analog Output Span Calibration w/Test Weights, no
F7.3.1		Analog Output Span Calibration with Keyboard, no default
F7.4		Analog Output Trim Adjustment, no default
F8.1	0	PLC Weight Data Type? (Weight in display increments)
F8.2	1	Rack Address?
F8.3	1	Start Quarter?
F8.4	1	Last Rack?
F8.5	2	Data Rate? (115.2 Kb)
F8.6	0	Enable Global data for Modbus Plus

F1 Scale Interface Program Block

The Scale Interface program block allows the user to set and calibrate the features that affect weighing performance. The following diagram describes this block:



Press **Select** to skip to the next program block. Press **Enter** to access the Scale Interface program block and configure the sub-blocks.

F1.1 Scale Type

[F1.1 X] SCALE TYPE: Enter the value for X that corresponds to the type of DigiTOL scale base or DigiTOL J-Box.

X=1 Reserved
X=2 DigiTOL Hi Res
X=3 DigiTOL Lo Res
X=4 DigiTOL J-Box
X=5 UltraRes Hi
X=6 UltraRes Lo

F1.2 Calibration Units Sub-block

[F1.2 X] CALIBRATION UNITS: Enter the value for X that corresponds to the type of test weights that will be used for calibration.

X = 1 lb
X = 2 kg
X = 3 g
X = 4 oz
X = 5 lb-oz
X = 6 ozt
X = 7 dwt
X = 8 t
X = 9 ton

Examples:
The Panther Terminal is calibrated using pound test weights and is switchable to ounces. Lb is the primary unit and "oz" (ounces) is the alternate unit. The "oz" overlay would be placed over "kg" on the PANTHER Terminal Display Lens.

The PANTHER Terminal is calibrated using kg test weights and is switchable to metric tons. Kg is the primary unit and "ton" (metric tons) is the alternate unit. The "ton" overlay would be placed over "lb" on the PANTHER Terminal Display Lens.

The PANTHER Terminal provides a wide selection of primary and alternate weight units. Primary units is selected in Step F1.2 as the Calibrated Unit. Alternate Units is selected in Step F2.1. The two selections most commonly used are lb and kg. If the primary and/or alternate weight unit selection is something other than lb or kg, an adhesive overlay (shipped with the PANTHER Terminal) needs to be installed over the "lb" or "kg" legend on the PANTHER Terminal display lens. This will correctly identify the displayed weight when shown converted to this unit (t for tons for example). The label should be applied as follows:

- If one of the selected units is lb, the overlay should be placed over "kg" on the lens.
- If one of the selected units is kg, the overlay should be placed over "lb" on the lens.
- If neither the primary or alternate unit is lb or kg, then the left cursor (lb position) is used to indicate the primary unit and the right cursor (kg position) is used to indicate the alternate unit.

F1.3 Scale Capacity Sub-block

[F1.3] SCALE CAPACITY

[XXXXXX] Current scale capacity, available for Numeric Entry editing.

Note that only legal scale capacities from the capacity table in chapter one are permitted.

Increment Size	LOAD CELL SCALE CAPACITIES							
	1000d	2000d	3000d	4000d	5000d	6000d	8000d	10000d
0.001	1	2	3	4	5	6	8	10
0.002	2	4	6	8	10	12	16	20
0.005	5	10	15	20	25	30	40	50
0.01	10	20	30	40	50	60	80	100
0.02	20	40	60	80	100	120	160	200
0.05	50	100	150	200	250	300	400	500
0.1	100	200	300	400	500	600	800	1000
0.2	200	400	600	800	1000	1200	1600	2000
0.5	500	1000	1500	2000	2500	3000	4000	5000
1	1000	2000	3000	4000	5000	6000	8000	10000
2	2000	4000	6000	8000	10000	12000	16000	20000
5	5000	10000	15000	20000	25000	30000	40000	50000
10	10000	20000	30000	40000	50000	60000	80000	100000
20	20000	40000	60000	80000	100000	120000	160000	200000
50	50000	100000	150000	200000	250000	300000	400000	500000

For lb-oz mode, the capacity must be entered in whole ounces.

Capacity (lb oz)	Increment (oz)	Calibration Capacity (oz)	# div
7 lb 8.00 oz	0.02	120	6000
9 lb 6.00 oz	0.05	150	3000
18 lb 12.00 oz	0.05	300	6000
18 lb 12.0 oz	0.1	300	3000
25 lb 0.0 oz	0.1	400	4000
37 lb 8.0 oz	0.1	600	6000
37 lb 8.0 oz	0.2	600	3000
50 lb 0.0 oz	0.2	800	4000
75 lb 0.0 oz	0.2	1200	6000
93 lb 12.0 oz	0.5	1500	3000
187 lb 8 oz	1	3000	3000
375 lb 0 oz	2	6000	3000
750 lb 0 oz	4	12000	3000

F1.4 Increment Size Sub-block

[F1.4] INCREMENT SIZE

[XXXX] Current Increment size is displayed for Selection List editing. Press the **Select** key to toggle through valid selections.

Calibration Sub-block

[CAL X] SCALE CALIBRATION PROCEDURE

X = 0 Skip calibration procedure
X = 1 Continue calibration

[E SCL] Empty scale platform and press Enter to continue.

[15 CAL] Delay while initial is set (display counts down). If the motion sensitivity is not disabled and motion is detected at this step, the display returns to the [E SCL] prompt.

[Add Ld] Place test weight on the scale platform, and press Enter.

['0'0000] Enter test weight value. No decimal point is permitted. Maximum test weight is 105% of full scale capacity.

[15 CAL] Delay while span is set (display counts down). If the motion is detected at this step then the display returns to the [Add Ld] prompt.

[CAL d] "Calibration done" is displayed momentarily.

Note: When in lb-oz mode, enter the test weight value in ounces.

F1.6 Zero Calibration Adjust Sub-block

[F1.6 X] ZERO CALIBRATION ADJUST

X = 0 Skip zero adjustment
X = 1 Store current initial on scale as zero.

[15 CAL] If zero calibration adjust is selected the display counts down from 15 to 0 while scale reading are being taken. Scale motion causes the countdown to restart from 15. Pressing Clear at anytime during the countdown aborts zero adjust so that the motion sensitivity selection can be modified. When the countdown reaches "0," the current scale reading is adjusted to be the new zero reading.

F1.7 Span Calibration Adjust Sub-block

[F1.7 X] SPAN CALIBRATION ADJUST

X = 0 Skip span calibration adjust
X = 1 Perform span calibration adjustment.

['0'0000] Numeric data entry of current scale test load. If the Enter key is pressed with the display showing "000000" then span adjust is aborted.

[15 CAL] After valid (non-zero) data entry, the display counts down from 15 to 0 while scale reading are being taken. Scale motion causes the countdown to restart from 15. Pressing the Clear key at anytime during the countdown aborts span adjust so that the motion sensitivity selection can be modified. When the countdown reaches "0" an attempt is made to calculate the span calibration. If the weight is negative, over-capacity or in expand mode, then "E 35" is displayed

to show that span adjustment cannot be performed. If the entered weight is more than twice the original displayed weight then "E 35" is displayed. Press any key to Clear the "E 35" message and proceed to the end of setup.

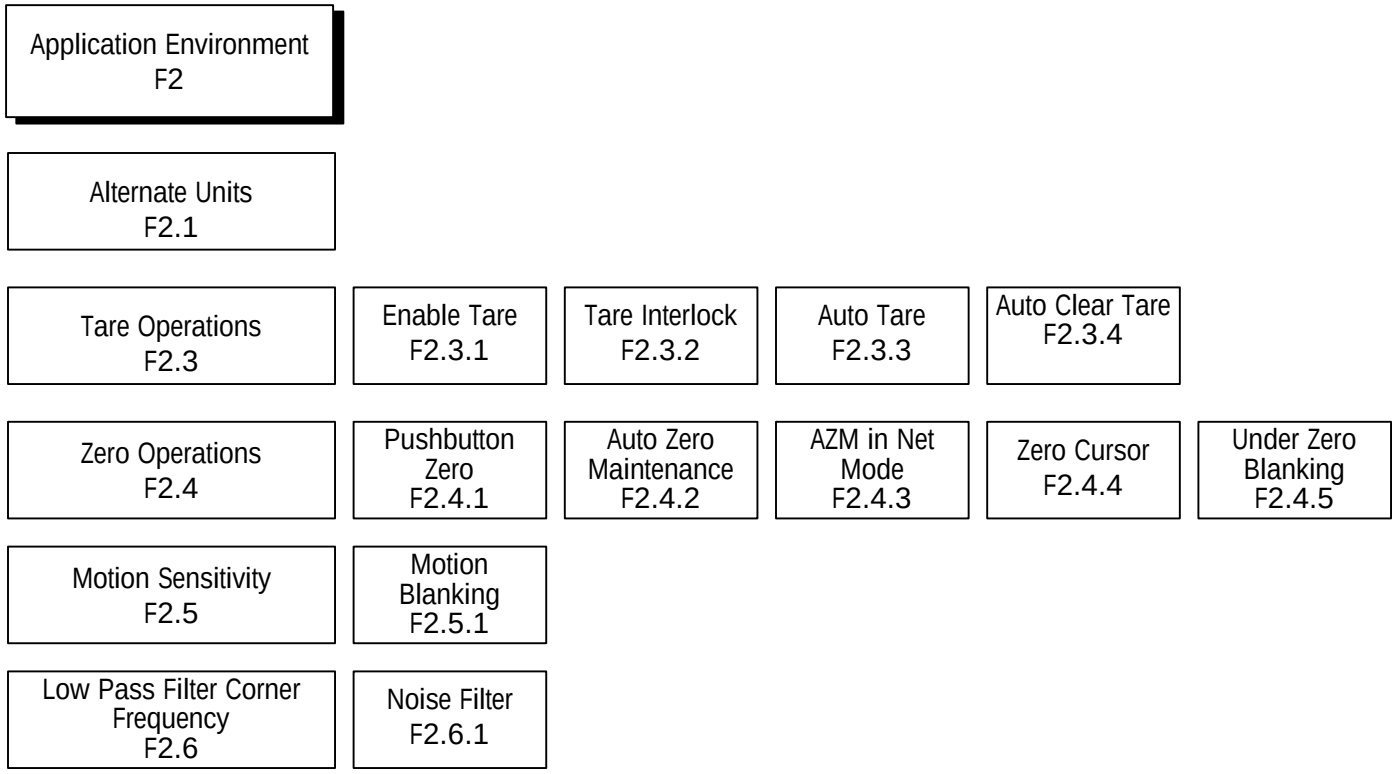
F1.8 Geo Code Sub-block

[F1.8 X X] GEO CODE

Values from 00 to 31 are accepted. The Geo Code is used to compensate for differences in the acceleration of gravity due to latitude and elevation, if the scale was calibrated in one location and subsequently moved to another location. Gravitational acceleration decreases with increasing height above sea level by approximately 0.2 parts per thousand every 1000 meters. The Geo Code has 32 settings with an increment size of 0.2 parts per thousand.

The default Geo Code is 16 (U.S.) See the Geo Code Table in Chapter 10, Appendix 3.

F2 Application Environment Block



[F2] APPLICATION ENVIRONMENT

Press **Select** to skip to [F3], press **Enter** to continue

F2.1 Alternate Units Sub-block

[F2.1 X] ALTERNATE UNITS: Enter a value for X that corresponds to the unit of measure desired as a secondary unit.

X = 0 None
X = 1 lb
X = 2 kg
X = 3 g
X = 4 oz
X = 5 lb-oz
X = 6 ozt
X = 7 dwt
X = 8 t
X = 9 ton

Examples:
The Panther Terminal is calibrated using pound test weights and is switchable to ounces. Lb is the primary unit and "oz" (ounces) is the alternate unit. The "oz" overlay would be placed over "kg" on the PANTHER Terminal Display Lens.

The PANTHER Terminal is calibrated using kg test weights and is switchable to metric tons. Kg is the primary unit and "ton" (metric tons) is the alternate unit. The "ton" overlay would be placed over "lb" on the PANTHER Terminal Display Lens.

The PANTHER Terminal provides a wide selection of primary and alternate weight units. Primary units is selected in Step F1.2 as the Calibrated Unit. Alternate Units is selected in Step F2.1. The two selections most commonly used are lb and kg. If the primary and/or alternate weight unit selection is something other than lb or kg, an adhesive overlay (shipped with the PANTHER Terminal) needs to be installed over the "lb" or "kg" legend on the PANTHER Terminal display lens. This will correctly identify the displayed weight when shown converted to this unit (t for tons for example). The label should be applied as follows:

- If one of the selected units is lb, the overlay should be placed over "kg" on the lens.
- If one of the selected units is kg, the overlay should be placed over "lb" on the lens.
- If neither the primary or alternate unit is lb or kg, then the left cursor (lb position) is used to indicate the primary unit and the right cursor (kg position) is used to indicate the alternate unit.

F2.3 Tare Operations Sub-block

[F2.3] TARE OPERATIONS

Press Select to skip to [F2.4], press Enter to continue

[F2.3.1 X] ENABLE TARE: Enter a value for X that will enable or disable Tare.

X = 0 Tare disabled
X = 1 Tare enabled

[F2.3.2 X] TARE INTERLOCK: The tare interlock feature, if enabled, places certain limitations on how tare values can be cleared and entered in legal-for-trade applications. Specifically, tare interlock meets legal-for-trade requirements by making the following restrictions:

- Tare weights can be cleared only at gross zero (with the scale empty)
- Tare can be entered only when the scale is in gross mode
- Previous tare values must be cleared before a new tare value can be entered (chain tare disabled)

X = 0 Tare Interlock disabled

X = 1 Tare interlock enabled

[F2.3.3 X] AUTO TARE

X = 0 Auto Tare disabled

X = 1 Auto Tare enabled after no motion following > 5d when in GROSS mode

[F2.3.4 X] AUTO CLEAR TARE

X = 0 Auto Clear Tare disabled

X = 1 Auto Clear Tare enabled, tare automatically clears at gross zero

F2.4 Zero Operations Sub-block

[F2.4] ZERO OPERATIONS

Press **Select** to skip to [F2.5], press **Enter** to continue

[F2.4.1 X] PUSHBUTTON ZERO ENABLE

X = 0 Pushbutton zero disabled

X = 1 Enable pushbutton zero and AZM within ±2% FS range

X = 2 Enable pushbutton zero and AZM within ±20% FS range

[F2.4.2 X] AUTOZERO MAINTENANCE: Auto Zero Maintenance (AZM) automatically compensates for small changes in zero resulting from material build-up or temperature changes. This sub-block lets you select the weight range (±) around gross zero within which the Panther will capture zero. If residual weight on the scale exceeds the weight range, the Panther will not capture zero.

If AZM=0, the tare and zero value will be stored during a power loss. The terminal will display a correct net value when power is restored.

X = 0 No AZM or zero capture at power-up

X = 1 AZM within 0.5 d window and power-up zero capture ±2%.

X = 2 AZM within 1d window and power-up zero capture ±2%.

X = 3 AZM within 3d window and power-up zero capture ±2%.

[F2.4.3 X] AZM IN NET MODE

X = 0 Disable AZM in net mode

X = 1 Enable AZM in net mode

[F2.4.4 X] ZERO CURSOR

X = 0 No Zero cursor

X = 1 Zero cursor enabled

[F2.4.5 X] UNDER ZERO BLANKING

X = 0 No Under Zero blanking

X = 1 Blank Display and internal signal “Under Capacity” if gross weight is greater than 5d under zero.

F2.5 Motion Sensitivity Selection Sub-block

[F2.5 X] MOTION SENSITIVITY SELECTION: The motion detection feature determines when a no-motion condition exists on the scale platform. The sensitivity level determines what is considered stable. Printing, pushbutton zero, and tare entry will wait for scale stability before carrying out the command.

Stability detection occurs over a predefined period of time and allows a predetermined “acceptable” amount of motion (in scale increments).

X = 0 Motion detector disabled

X = 1 1.0 d motion sensitivity

X = 2 3.0 d motion sensitivity

[F2.5.1 X] MOTION BLANKING

X = 0 Blanking disabled

X = 1 Blank the weight display during motion

F2.6 Low Pass Filter Corner Frequency

[F2.6 X.X] LOW PASS FILTER CORNER FREQUENCY

X.X is the numeric data entry for the low pass filter corner frequency (0.5 - 9.9 Hz).

[F2.6.1 X] NOISE FILTER ENABLE/DISABLE

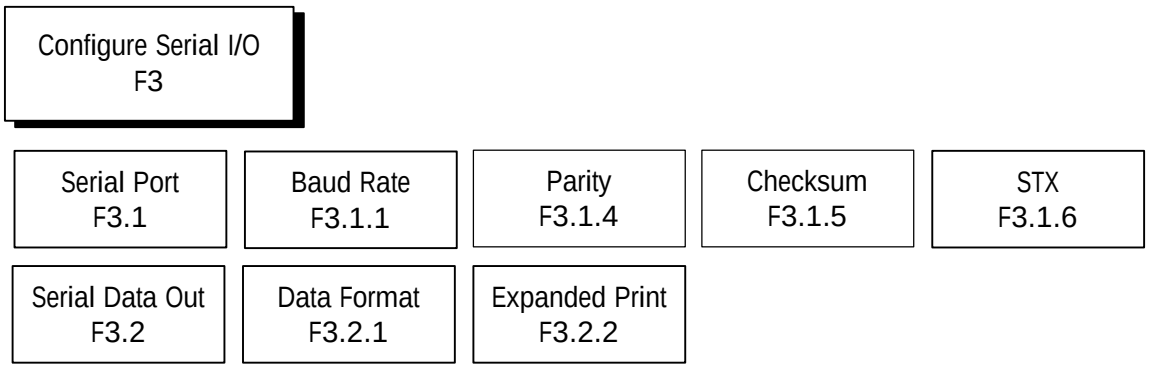
X = 0 Disable noise filter

X = 1 Enable noise filter

Note: Noise filter should not be enabled in batching or filling operations.

F3 Configure Serial I/O Block

Press **Select** to skip to F4, press **Enter** to continue.



[F3] CONFIGURE SERIAL I/O

Press **Select** to skip to [F4], press **Enter** to continue

F3.1 Select Serial Port Sub-block

[F3.1 X] SELECT SERIAL PORT (Future)

[F3.1.1] DATA RATE

[XXXX] XXXX = Select 300, 1200, 2400, 4800, or 9600 baud

[F3.1.2 X] Not Used (Future)

[F3.1.3 X] Not Used (Future)

[F3.1.4 X] PARITY

X = 0 No parity
X = 1 Odd parity
X = 2 Even parity

[F3.1.5 X] CHECKSUM

X = 0 No checksum sent
X = 1 Checksum enabled

[F3.1.6 X] STX

X = 0 No STX sent
X = 1 STX enabled

F3.2 Serial Data Out Sub-block

Refer to Chapter 10 Appendix 1 and 2 for details on output strings.

[F3.2 X] SERIAL DATA OUT (COM1 only)

X = 0 Continuous mode. If continuous mode, skip to [F3.2.3 X].

X = 1 Demand mode. Continue to next step.

X = 2 SICS Protocol

[F3.2.1 X] DATA FORMAT (COM1, Demand Mode output only)

X = 0 Single line, displayed weight only.

X = 1 Single line, gross, tare and net.

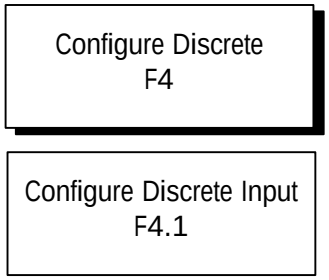
X = 2 Multiple line, gross, tare and net.

[F3.2.2 X] EXPANDED PRINT (COM1, Demand Mode output only)

X = 0 Normal print

X = 1 Expanded print

F4 Configure Discrete Block



[F4] CONFIGURE DISCRETE

Press **Select** to skip this block, press **Enter** to continue

F4.1 Configure Discrete Input Sub-block

[F4.1 X] CONFIGURE DISCRETE INPUT

Assign a function to the discrete input:

X = 0 No function

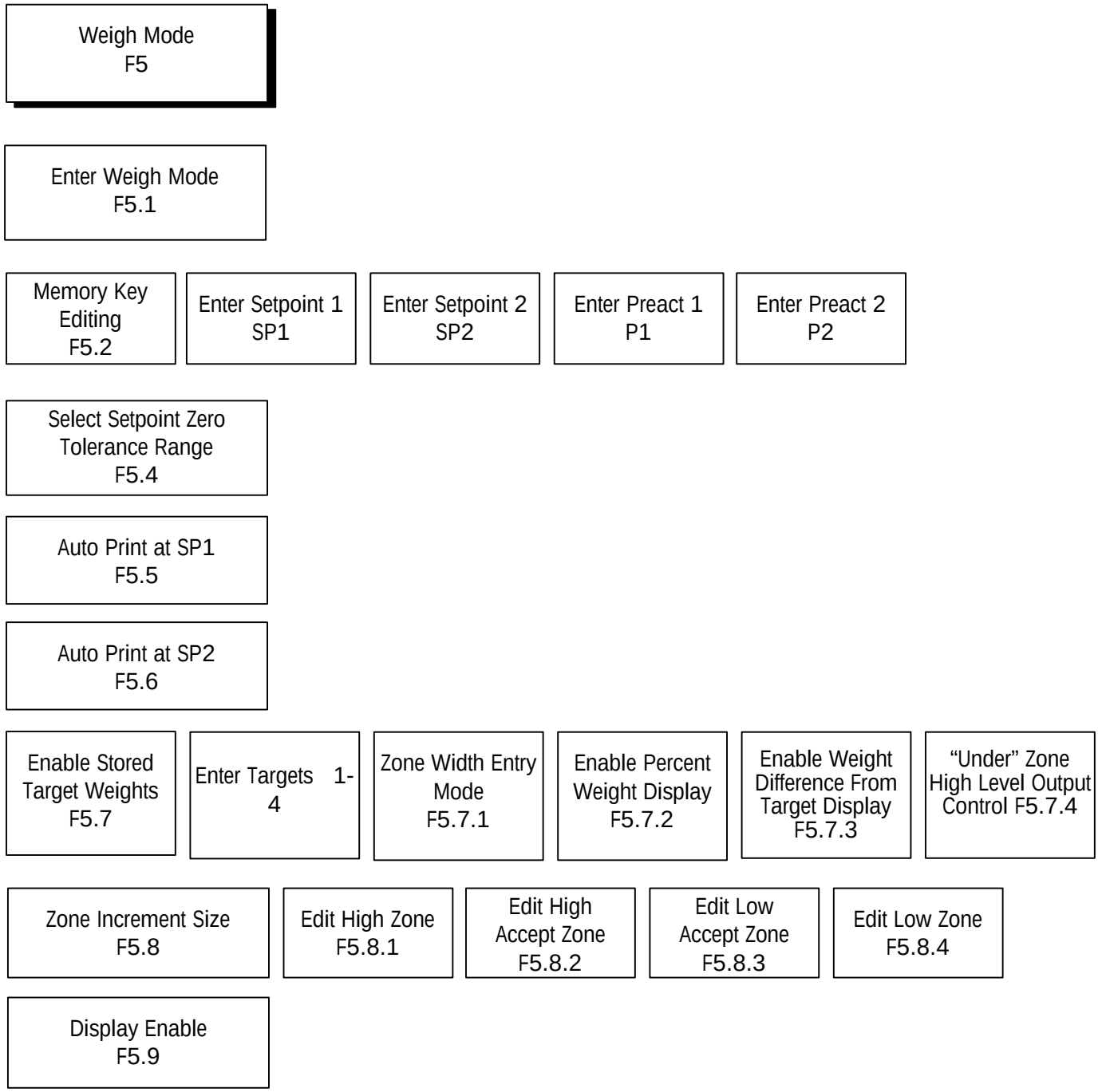
X = 1 Print

X = 2 Tare

X = 3 Zero

X = 4 Select (switches units)

F5 Weigh Mode Block



[F5] WEIGH MODE

Press **Select** to skip to [F6], press **Enter** to continue

F5.1 Enter Weigh Mode Sub-block

[F5.1 X] ENTER WEIGH MODE

X = 0 Indicator (Setpoints & Targets disabled) If true, skip to [F6]
X = 1 Setpoint.
X = 2 Over/Under

F5.2 Memory Key Editing Sub-block

[F5.2 X] MEMORY KEY EDITING

X = 0 No Setpoint or Over/Under editing using **Memory** key

Setpoint or Over/Under editing only in Setup Mode.

Proceed to Setpoint or Over/Under Editing.

X = 1 Setpoints/Targets may be edited only using the **Memory** key.

Preact /Zones editing only in Setup Mode.

Proceed to Preact or Zone Editing.

X = 2 Setpoints/Targets & Preacts/Zones may be edited only using

the **Memory** key. Tolerance editing only in Setup mode.

Proceed to Tolerance Editing. (Setpoint Mode Only)

X = 3 All Setpoint or Over/Under editing is done only using the **Memory** key.

The following section permits editing of Setpoint related functions.

If the Weigh Mode is “Indicator” or “Over/Under” skip this section.

If Memory Key Editing (F5.2) > 0, skip Setpoint Entry.

Note: The next two sections related to the entry of setpoint values are allowed from the front panel.

[SP1] ENTER SETPOINT 1

Press **Clear** to go to preact editing

Press **Enter** to proceed.

[‘0’12345] Display now shows the previous setpoint 1 value, which may now be edited. If the new setpoint value is less than the existing preact value, then [E 20] will be displayed for approximately 2 seconds to flag the error before the display returns to the [SP1] display.

[SP2] ENTER SETPOINT 2

Press **Clear** to proceed to preact editing

Press **Enter** to proceed.

Press **Zero** to backup to [SP1]

['0'12345] Display shows the previous setpoint 2 value. If the new setpoint value is less than the existing preact value, then [E 20] will be displayed for approximately 2 seconds to flag the error before the display returns to [SP2].

If the Weigh Mode is "Indicator" or "Over/Under" skip this section.

If Memory Key Editing (F5.2) > 1, skip Preact Entry.

Note: If the editing of Preact values from the front panel is allowed, skip the next two steps related to Preact Entry.

Values entered for preact adjust the corresponding cutoff action as follows:

Setpoint actuation = Setpoint entry - preact entry

[P1] ENTER PREACT FOR SETPOINT 1

Press Clear to go to end of set-up.

Press Enter to proceed.

['0'12345] Display shows the previous preact value for editing.

Press Zero back up to [SP2].

Press Enter to accept entry and go to [P2]

Press Clear to zero display and start entry of a new value.

If the new preact value is greater than the existing setpoint value, then [E 20] will be displayed for approximately 2 seconds to flag the error before the display returns to the [P1] display.

[P2] ENTER PREACT FOR SETPOINT 2

Press Clear to go to end of set-up.

Press Enter to proceed.

['0'12345] Display shows the previous preact 2 value for editing.

Press Zero back up to [P1].

Press Enter to accept entry and proceed to [F5.4]

Press Clear to zero display and start entry of a new value.

If the new preact value is greater than the existing setpoint value, then [E 20] will be displayed for approximately 2 seconds to flag the error before the display returns to the [P2] display.

Note: If the editing of setpoint zero tolerance values from the front panel is allowed, skip the next section.

If the Weigh Mode is "Indicator" or "Over/Under" skip this section.

If Memory Key Editing (F5.2) > 2, skip Setpoint Entry.

F5.4 Select Setpoint Zero Tolerance Range Sub-block

[F5.4 X] SELECT SETPOINT ZERO TOLERANCE RANGE.

X = 0 no zero tolerance output.

X = 1 1 increment.

X = 5 5 increments.

F5.5 Auto Print at SP1 Sub-block

When Auto Print is enabled, the PRINT key and ASCII input print command (P) is ignored.

(Only appears if Over/Under Mode is selected in F5.1)

[F5.5 X] AUTO PRINT AT SP1 (Setpoint Mode only)

X = 0 Auto print at SP1 disabled

X = 1 Auto print when setpoint reached after coming from zero.

F5.6 Auto Print at SP2 Sub-block

[F5.6 X] AUTO PRINT AT SP2 (Setpoint Mode only)

X = 0 Auto print at SP2 disabled

X = 1 Auto print when setpoint reached after coming from zero.

F5.7 Enable Stored Target Weights Sub-block

[F5.7 X] ENABLE STORED TARGET WEIGHTS

X = 0 Disable stored target weight, skip to zone editing

X = 1 Enable stored target weight. If entry of target values from the front panel is allowed, skip the next four steps related to target entry.

[SP1] ENTER TARGET 1

Press Clear to go to zone editing

Press Enter to proceed.

Press Zero to backup to [F5.7]

[‘0’12345] Display now shows the previous target 1 value for editing

[SP2] ENTER TARGET 2

Press Clear to go to zone editing

Press Enter to proceed.

Press Zero to backup to [SP1]

[‘0’12345] Display now shows the previous target 2 value for editing

[SP3] ENTER TARGET 3

Press Clear to go to zone editing

Press Enter to proceed.

Press Zero to backup to [SP2]

[‘0’12345] Display now shows the previous target 3 value for editing

[SP4] ENTER TARGET 4

Press Clear to go to zone editing

Press Enter to proceed.

Press Zero to backup to [SP3]

['0'12345] Display now shows the previous target 4 value for editing

If the Weigh Mode is "Indicator" or "Setpoint" skip to Diagnostics

[F5.7.1 X] ZONE WIDTH ENTRY MODE

X = 0 Zone width is entered in increments (0-15)

X = 1 Zone width is entered in percent of target (0-4%)

If units switching is enabled, display is always in weight units; skip this prompt.

[F5.7.2 X] ENABLE PERCENT WEIGHT DISPLAY

X = 0 Weight display is in weight units

X = 1 Weight display is in percent of target

[F5.7.3 X] ENABLE WEIGHT DIFFERENCE FROM TARGET DISPLAY MODE

When enabled, if a valid target weight is available , weight is displayed as the difference from the target weight instead of the "normal" weight.

X = 0 Disable Weight Difference from Target

X = 1 Enable Weight Difference from Target

If the Weigh Mode is "Indicator" or "Setpoint" skip this section.

[F5.7.4] "UNDER" ZONE HIGH LEVEL OUTPUT CONTROL

X = 0 High Level Output always on when weight falls below "Low" Zone (In "Under" Zone)

X = 1 High Level Output on until weight reaches 10 increments of gross zero or less.

If the entry of zone values from the front panel is allowed, skip to section 5.9.

F5.8 Zone Increment Size Sub-block

[F5.8] ZONE INCREMENT SIZE (over/under mode only)

[F5.8.1 XX] EDIT HIGH ZONE

XX = Current number of increments for High zone for selection list editing. (0 to 4.0% of target or 0 to 15 increments of weight)

[F5.8.2 XX] EDIT HIGH ACCEPT ZONE

XX = Current number of increments for High Accept zone for selection list editing.

[F5.8.3 XX] EDIT LOW ACCEPT ZONE

XX = Current number of increments for Low Accept zone for selection list editing.

[F5.8.4 XX] EDIT LOW ZONE

XX = Current number of increments for Low zone for selection list editing.

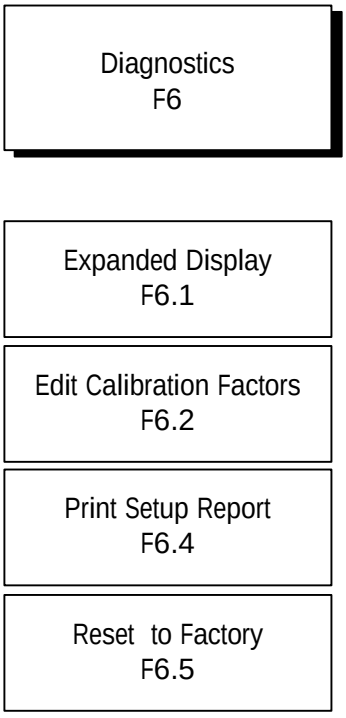
F5.9 Display Enable Sub-block

[F5.9 X] DISPLAY ENABLE

X = 0 Status lights only

X = 1 Weight display and status lights

F6 Diagnostics Block



[F6] DIAGNOSTICS

Press **Select** to skip to [F7], press **Enter** to continue

F6.1 Expanded Display Sub-block

[F6.1 X] EXPANDED DISPLAY.

X = 0 Normal display mode

X = 1 Weight displayed in minors

F6.2 Edit Calibration Factors Sub-block

[F6.2 X] EDIT CALIBRATION FACTORS

X = 0 Skip this block

X = 1 Edit calibration factors

[123456] Zero factor, available for numeric data editing

[123456] Span factor, available for numeric data editing, page 1

[123456] Span factor, available for numeric data editing, page 2

F6.4 Print Setup

[F6.4 X] PRINT SETUP

X = 0 Skip this sub-block

X = 1 Print setup report

F6.5 Reset to Factory

[F6.5 X] RESET SOFTSWITCH CONFIGURATION TO FACTORY SETTINGS

X = 0 Skip this sub-block

X = 1 Restore all settings to factory defaults

[LOAd 0] Are you sure prompt. Toggle to “1” for yes, “0” to abort, then press Enter. If “yes”, soft switches are now set to the factory default values.

F7 Analog Output Option Block

Analog Output Option
F7

Analog Output Zero Calibration with Test Weights F7.2

Analog Output Zero Calibration Via Keyboard F7.2.1

Analog Output Span Calibration with Weights F7.3

Analog Output Span Calibration via Keyboard F7.3.1

Analog Output Trim Adjustment F7.4

[F7] ANALOG OUTPUT OPTION (if option is installed)

Press Select to skip to [CALOFF], press Enter to continue

F7.2 Analog Output Zero Calibration with Test Weights

[F7.2 X] ANALOG OUTPUT ZERO CALIBRATION WITH WEIGHTS

If X=0 then, Skip this step.

If X=1 then proceed to:

[0 Ld] Operate the Enter key to acknowledge desired 'zero' weight is on scale.

[15 CAL] Delay while reading for application zero reading taken. Go to [F7.3 X].

[F7.2.1 X] ANALOG OUTPUT ZERO CALIBRATION VIA KEYBOARD

X = 0 Skip this step.

[ZZZZZZ] X = 1 Numeric Data entry of the previous application zero offset value.

F7.3 Analog Output Span Calibration with Test Weights Sub-block

[F7.3 X] ANALOG OUTPUT SPAN CALIBRATION WITH WEIGHTS

X = 0 Skip this step.

[15 CAL] X = 1 Delay while zero reading for span determination is made.

[Add Ld] Press Enter key to acknowledge addition of 'span' weight to the platform.

[15 CAL] Delay while reading for span determination is made. If a weight representing less than 1000d is used, an error message [E 32] is displayed and the previous span calibration is retained. This error display can be terminated by:

Zero key -- prompt [F7.2 X]

Clear key -- prompt [CALOFF].

Enter key-- prompt [F7.4 X]

If no errors occurred, then advance to [CALOFF]

[F7.3.1 X] ANALOG OUTPUT SPAN CALIBRATION VIA KEYBOARD

X = 0 Skip this step

[SSSSSS] X = 1 Numeric Data entry of previous application span factor value.

F7.4 Analog Output Trim Adjustment

[F7.4] ANALOG OUTPUT TRIM ADJUSTMENT

X=0 Skip this section
X=1 Continue calibration using constant Zero and Full Scale values.

X=2 Continue calibration using active load cell weight. Empty the scale when calibrating Zero and load scale when adjusting Span.

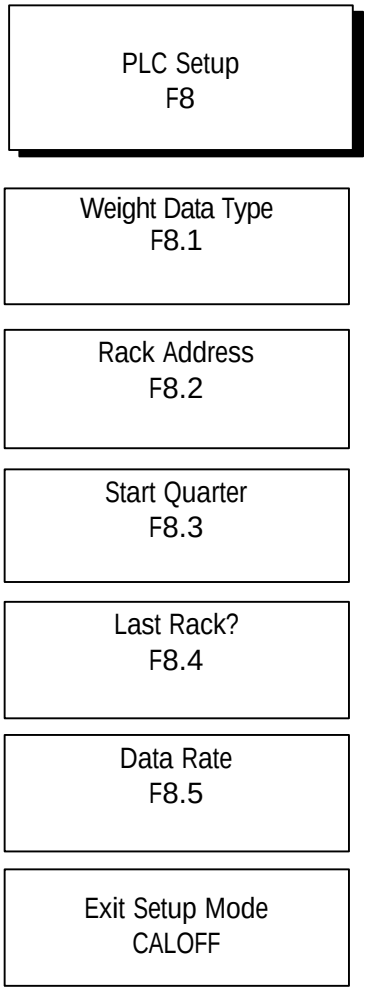
[0 FAS] Decrease zero reading analog output with **Select** key or increase with **Zero** key. One 'click' per key operation.

[0 SLO] If **Memory** key is pressed, then alter zero reading analog output as above but at a slower rate. Successive operation of the **Memory** key causes a toggle back and forth between fast and slow mode operation. Finish entry with Enter key. Abort using the Clear key.

[S FAS] Decrease span reading analog output with **Select** key or Increase with the **Zero** key. One 'click' per key operation.

[S SLO] If the **Memory** key is pressed, then alter span reading as above at a slower rate. Successive operation of the **Memory** key causes a toggle back and forth between fast and slow mode prompt and operation. Finish entry with **Enter** key. Abort using the **Clear** key.

F8 PLC Setup Sub-Block



[F8] PLC Setup (if option is installed) for Allen-Bradley, PROFIBUS, and Modbus Plus Interface PCBs.

Press **Select** to skip to [Exit Setup], press **Enter** to continue

F8.1 Weight Data Type

[F8.1 X] WEIGHT DATA TYPE

X=0 Weight is in display increments, decimal point is implied

X=1 Weight is in integer increments, no decimal point implied

F8.2 Rack Address

[F8.2 XXX] RACK ADDRESS

XXX Scale node address. 1-64 for Allen-Bradley/Modbus Plus, 0-126 for PROFIBUS.

F8.3 Start Quarter Address

[F8.3 X] START QUARTER ADDRESS (Allen-Bradley Only)

X=Starting ¼ rack address, 1-4.

F8.4 Data Rate

[F8.4 X] LAST RACK? (Allen-Bradley Only)

X=0 No
X=1 Yes

F8.5 Data Rate

[F8.5 X] DATA RATE (Allen-Bradley Only)

X=1 57.6 Kb
X=2 115.2 Kb
X=3 230.4 Kb

F8.6 Global Data Enable

[F8.6 X] GLOBAL DATA ENABLE (Modbus Plus Only)

X=0 Global Data Disabled
X=1 Global Data Enabled

Exit Setup Mode Sub-block

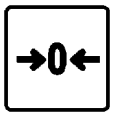
[CALOFF] EXIT SETUP MODE

The prompt reminds the user to move the **Setup** switch to “off”.

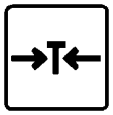
Press **Zero** to return to the previous block.

Press **Enter** to exit setup.

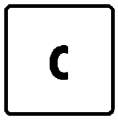
4 Panther Keypad



The Zero key is used to compensate for small changes in weight when the scale platform is empty. These changes in weight are most often caused by material spilling onto the weighing platform. To zero the indication of weight, press this button.



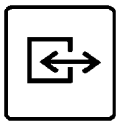
The Tare key is used to subtract the weight of the object on the scale platform from subsequent indications of weight. This is most often the weight of an empty container. Once this value is "tared," the indication of weight will change to indicate net weight. To tare the scale, place an empty container on the scale and press this button.



The Clear key is used to clear a previously entered tare value. To clear the tare value, press this button. The indication of weight will return to the gross mode, showing the total weight of the objects on the scale platform.

The Memory key is used to access setpoint or target weight values. Operator access to these values must be enabled in the set up mode. Refer to the advanced operation section for details on how to change these values.

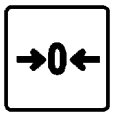
The Select key allows the operator to switch between the primary and secondary weighing units. To change weighing units, press this button. Each initiation of this button will either switch the display units from the primary to the secondary units, or back to the primary from the secondary. A cursor will change indicating which units are being displayed. This key is also used in the setup and programming modes to select between yes and no replies and to change displayed values.



The Transact (Print) key is used to initiate a serial output of the weight data. To request this transmission of data, press this button. The actual format of the data string is determined in set-up. This key is also used to accept a response to a setup or programming question.

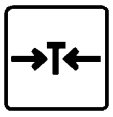
Operator Functions

Zero the Scale



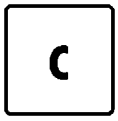
If the scale platform is empty and the NET cursor is NOT lit, press the zero button to compensate for any material which may be on the scale platform. The zero button is limited to compensating weight that is between ±2% (or ±20%, if programmed accordingly) of the scale's weighing capacity.

Tare Operations



Determine the weight of the material inside a container, weighing in the NET mode

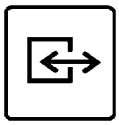
1. Place an empty container on the scale platform
2. Press the Tare button
3. Fill the container or place a filled container of equivalent weight on the scale
4. The indicator will display the net weight and the NET cursor will light.



Clearing a tare weight:

With the scale in the net weight mode (a tare weight previously entered). press the Clear key. The net cursor will go out and the net weight will be displayed.

Print Operations



Printing a weight:

1. If desired, tare the weight of an empty container using the steps described above.
2. Place a load on the weighing platform.
3. Press the Transact or Print key.

Advanced Scale Operations

Entry of Setpoint Data During Normal Operation

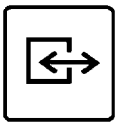
The Panther Terminal is provided with the capability of two coincidence setpoints with preact control. While setpoint values are always entered as positive values, the controls can be set up to turn outputs off when either a positive value (feeding

into something on the scale) or a negative weight value (discharging from the scale into a container). The setpoint control may be used with optional high level outputs available with the Panther Panel Mount versions. These high level outputs may be used in conjunction with external devices that may be provided by other parties.

A setpoint is a target value that you may wish to use to stop a feeding or discharging device. When the weight on the scale exceeds the setpoint value, the setpoint output is turned off. In addition to the setpoint values, the Panther provides the ability to enter and use preact values. Preact is used to anticipate the amount of material which may be between the feeder and the scale when the feeder is turned off, or may be used to anticipate the reaction time of the feeder or gate. A zero tolerance value is also available. This can be used as a control check to make sure the hopper or scale has returned to within a preset tolerance of zero before the next operation may begin.

The setpoint mode of operation must be enabled during setup (refer to the Technical Manual for details).

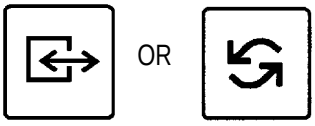
1. With the scale in the normal operating mode, press the M (Memory) key.
2. The display shows “SP1 0” indicating that you do NOT wish to enter or adjust the first setpoint value.



3. Press the Transact (Print) key if you do NOT wish to enter or adjust this setpoint value and to proceed to the next step (adjusting the value of the next setpoint) .

OR

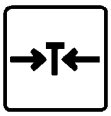
3. Press the Select key to change the display to “SP1 1” indicating that you DO wish to enter or adjust the first setpoint value.



4. Press the Transact (Print) key to verify your selection or press the Select key to change the response back to a 0 or no.

5. The display will now show the current value stored as setpoint value. The most significant digit blinks indicating it may be adjusted. You may press C to clear the current entry.

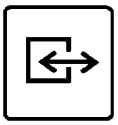
6a. To move the active digit to the right, use the M (Memory) key (a small right arrow appears below the key).



6b. To move the active digit to the left, use the Tare key (a small left arrow appears below the key).

7. To increase the value of the flashing digit (for example to change from 3 to 4), use the Select key.

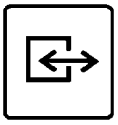
8. Use the above keys to change the digits representing the setpoint value. You may use the Memory (move right) and Tare (move left) keys and the Select (increase number) key in any combination you wish.



9. When the proper setpoint value is displayed, press the Transact (Print) key to accept your entry.

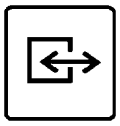
10. "SP2 0" is now displayed, indicating that you do NOT wish to edit the value for setpoint 2

11. If you wish to adjust the value of setpoint 2, follow steps 3 - 9 as described above.



12. Press the Transact (Print) key to move on to adjusting preact values (this capability must have been enabled in Setup).

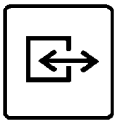
Preact is the amount of material which may be in suspension immediately after a signal to close or turn off a feeder is sent. The preact amount is entered as a value relative to the setpoint. For example, if you wish to have a final weight on the scale of 100 kg, and the material which will fall from the feeder as it stops will add another 2 kg, set your preact value for 2. When the material settles on the scale, the final weight should be 100 kg.



13. The display now shows "P1 0" indicating that you do NOT wish to adjust or enter a preact value for setpoint 1. If you do NOT wish to adjust the preact value for setpoint 1, press the Transact (Print) key.

OR

14. Press the Select key to change the display to "P1 1" indicating that you DO wish to enter or adjust the preact value for the first setpoint.

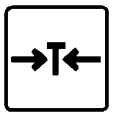


OR

15. Press the Transact (Print) key to verify your selection or press the Select key to change the response back to a 0 or no.

16. The display will now show the current value stored as the preact value. The most significant digit blinks indicating it may be adjusted. Press C to clear the current value.

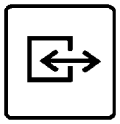
17. To move the active digit to the right, use the M (Memory) key (a small right arrow appears below the key).



18. To move the active digit to the left, use the Tare key (a small left arrow appears below the key).

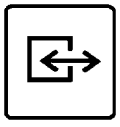
19. To increase the value of the flashing digit (for example to change from 3 to 4), use the Select key.

20. Use the above keys to change the digits representing the preact value. You may use the Memory (move right) and Tare (move left) keys and the Select (increase number) key in any combination you wish



21. When the proper preact value is displayed, press the Transact (Print) key to accept your entry.

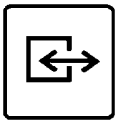
22. P2 0" is now displayed, indicating that you do NOT wish to edit the preact value for setpoint 2



23. If you wish to adjust the preact value, follow steps 13 - 19 as described above.

24. Press the Transact (Print) key to move on to adjusting the zero tolerance range (this capability must have been enabled in Setup)

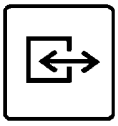
25. "L 0" is now displayed, indicating that you do NOT wish to adjust the zero tolerance value.



26. If you do NOT wish to adjust the zero tolerance value, press the Transact (Print) key

OR

26. Press the Select key to change the display to "L 1" indicating that you DO wish to adjust the zero tolerance value.



27. "F5.4 x" is displayed, where x is either 0,1, or 5 representing that number of increments.

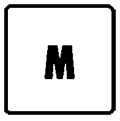
28. Press the Transact (Print) key to verify your selection or press the Select key to change the response to another value.

29. The display will now return to the normal weighing mode.

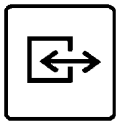
Entry of Target Over/Under Values During Normal Operation

The Panther is designed as an "Over/Under" indicator. A series of LEDs indicate if a weight on the scale platform is within acceptable tolerances of a target weight. Four different target values may be stored and recalled by the operator. "Over/Under" mode may be used with optional High Level outputs. Three output "Over", "OK", and "Under" are available.

High and low accept zones may also be specified. These zones may be determined as a percentage of the target value or as a number of increments of weight as related to the target value. The high and low accept zones define the acceptable tolerances around a target value. The high and low zones define the point at which the item being checked is outside an acceptable tolerance around a target weight. Setting of target values and tolerance values must be enabled in the setup of the Panther.



1. With the scale in the normal operating mode, press the M (Memory) key.



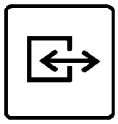
2. The display shows "SP1 0" indicating that you do NOT wish to enter or adjust the first target value.

3. Press the Transact (Print) key if you do NOT wish to enter or adjust this target value and to proceed to the next step (adjusting the value of the next target).

OR

3. Press the Select key to change the display to "SP1 1" indicating that you DO wish to enter or adjust the first target value.

4. Press the Transact (Print) key to verify your selection or press the Select key to change the response back to a 0 or no.



OR

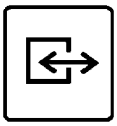
5. The display will now show the current value stored as target value. The most significant digit blinks indicating it may be adjusted. Press C to clear the current value.

6a. To move the active digit to the right, use the M (Memory) key (a small right arrow appears below the key).

6b. To move the active digit to the left, use the Tare key (a small left arrow appears below the key).

7. To increase the value of the flashing digit (for example to change from 3 to 4), use the Select key.

8. Use the above keys to change the digits representing the target value. You may use the Memory (move right) and Tare (move left) keys and the Select (increase number) key in any combination you wish.



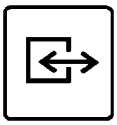
9. When the proper setpoint value is displayed, press the Transact (Print) key to accept your entry.

10. "SP2 0" is now displayed, indicating that you do NOT wish to edit the value for target 2.

11. If you wish to adjust the value of target 2, follow steps 3 - 9 as described above.

12. Repeat for targets 3 and 4.

13. Press the Transact (Print) key to move on to adjusting high and low zone values (this capability must have been enabled in Setup).

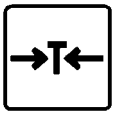


Acceptable tolerance zones may be set for both high and low weights. Access to these values by the operator must be enabled in the setup of the Panther. If this has not been enabled, the following steps will not be available to the operator.

14. The display now shows "F5.8.1 xx" indicating the current high zone value. This value may be between 0.0 and 4.0% of the target value or within 0 to 15 increments of target value. Selection of percentage or weight units is determined in Setup.

15. The display will now show the current value stored as the high zone value. The most significant digit blinks indicating it may be adjusted.

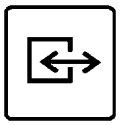
16. To move the active digit to the right, use the M (Memory) key (a small right arrow appears below the key).



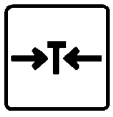
17. To move the active digit to the left, use the Tare key (a small left arrow appears below the key).

18. To increase the value of the flashing digit (for example to change from 0 to 1), use the Select key.

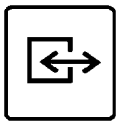
19. Use the above keys to change the digits representing the high zone value. You may use the Memory (move right) and Tare (move left) keys and the Select (increase number) key in any combination you wish



20. When the proper high zone value is displayed, press the Transact (Print) key to accept your entry.
21. "F5.8.2 xx" is now displayed, indicating the current high accept zone value.
22. If you wish to adjust this value, follow steps 16 - 20 as described above. Otherwise, press the Transact (Print) key to move on to the next step.
23. "F5.8.3 xx" is now displayed, indicating the current low accept zone value.
24. If you wish to adjust this value, follow steps 16 - 20 as described above. Otherwise, press the Transact (Print) key to move on to the next step.
25. "F5.8.4 xx" is now displayed, indicating the current low zone value.
26. If you wish to adjust this value, follow steps 16 - 20 as described above. Otherwise, press the Transact (Print) key to return to the normal weighing mode.
27. To select a target value to be used, the scale must be at gross zero.



28. Press the Tare key. "SP1" is displayed momentarily, and is followed by the current target 1 value.



29. If you wish to use this target, press the Transact (Print) key.
30. If you wish to use a different value, press the Tare key to display the next target.

Over/Under Mode Operation

If configured as over/under mode, setup step [F5.1 2], the Tare key serves to enter the target weight. Pressing the Tare key when the indicated weight is not at zero and with "no motion" will store the weight value on the scale as the target weight and the accept LED will illuminate.

Pressing the Tare key when the indicated weight is at zero permits selections of one of the four stored target values. Initially "SP1" is momentarily displayed followed by the target 1 value. If you wish to use this target value, press the Transact (Print) key. If you with another target, press the Tare key again.

Pressing Clear in the over/under mode will clear the stored target weight and disable the LED display.

Zone Width Programming

If the Panther Terminal is used in the over/under mode, the zone width edges must be determined and programmed into the Panther Terminal memory before the status LED's display will be usable.

To calculate the parameters entered into the zone programming group, (steps F5.8.1, F5.8.2, F5.8.3, and F5.8.4) divide the desired zone width by the increment size (programmed during calibration). The High Accept zone width must be subtracted from the High zone width and the Low Accept zone width must be subtracted from the Low zone width for the calculation to be correct.

Zone Width Programming Example

The Panther Terminal is programmed for a scale capacity of 100 by 0.02 lb increment size. The end user requests the following zone edges:

Over weight = 0.52 lb or more above the target weight
Highest High Accept weight = 0.50 lb above the target weight
Highest Accept weight = 0.30 lb above the target weight
Lowest Accept weight = 0.20 lb below the target weight
Lowest Low Accept weight = 0.40 lb below the target weight
Under weight = 0.42 lb or more below the target weight

High zone edge is equal to 10 divisions, (0.5 lb - 0.3 lb) ÷ 0.02 lb

High Accept zone edge is equal to 15 divisions, 0.3 lb ÷ 0.02 lb

Low Accept zone edge is equal to 10 divisions, 0.2 lb ÷ 0.02 lb

Low zone edge is equal to 10 divisions, (0.4 lb - 0.2 lb) ÷ 0.02 lb

In other words, the Accept (OK) LED (middle red LED in the PN enclosure, or green LED in the HN enclosure) will stay lit while the weight is less than or equal to the target plus 0.30 lb and greater than or equal to the target minus 0.20 lb. The Over OK LED (not available in the PN enclosure or upper yellow LED in the HN enclosure) will light if the weight is greater than the target plus 0.30 lb and less than or equal to the target plus 0.50 lb. The Under OK Led (not available in the PN enclosure or lower yellow LED in the HN enclosure) will light if the weight is less than the target minus 0.20 lb and greater than or equal to the target minus 0.40 lb. The Over LED (upper red LED in the PN and HN enclosures) will light if the weight is greater than the target plus 0.50 lb. The Under LED (lower red LED in the PN and HN enclosures) will light if the weight is less than the target minus 0.40 lb.

Zone Width as a Percent of Target

To calculate the zone widths, when using percentage of target weight, setup step [F5.7.1 1], remember that up to 4% of the programmed weight can be selected for each of the zones. This means weight of up to 4% of the target weight can be put on the platter before the yellow over accept LED (HN enclosure only) will turn

on. Add up to another 4% of the target weight, or 8% total, before the red over LED will turn on. The same is true for the under LED's.

Zone Width as a Percent of Target Example

The scale is calibrated for 10 lb by 0.005 lb increment size. Each zone is set for the full 4% of target weight. The operator places 2 lb on the platter and presses the Tare key. The Accept (OK) range will be from 2 lb - (2 lb x 4%) to 2 lb + (2 lb x 4%). The Over OK range will be from 2 lb + (2 lb x 4%) + 0.005 lb to 2 lb + (2 lb x 8% or 4% + 4%). The Under OK range will be from 2 lb - (2 lb x 4%) - 0.005 lb to 2 lb - (2 lb x 8 % or 4% + 4%).

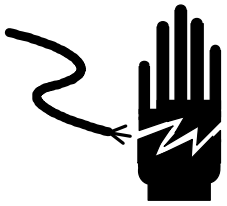
The display reads (2.000) and the Accept (OK) LED is lit.

At 2.085 lb the Accept LED will turn off and the Over OK LED will turn on. At 2.165 lb the Over OK LED will turn off and the Over LED will turn on.

At 1.915 lb the Accept OK LED will turn off, and the under OK LED will turn on. At 1.835 lb, the Under OK LED will turn off and the Under LED will turn on.

5 Service and Maintenance

Cleaning and Maintenance



WARNING

ONLY PERMIT 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.

Wipe the keyboard with a clean, soft cloth dampened with a mild glass cleaner. Do not use any type of industrial solvent such as toluene or isopropanol (IPA). These may damage the terminal's finish. Do not spray cleaner directly onto the terminal. Regular maintenance inspections by a qualified service technician are also recommended.

Troubleshooting

The PANTHER Terminal is designed to be virtually error free and reliable. If problems do occur, do not attempt to repair the scale or terminal before the source of the problem has been determined. Record as much information as possible about what has happened including any error messages and physical responses of the terminal and/or scale. If the PANTHER Terminal is malfunctioning, perform the troubleshooting tests described in the next few pages, to identify the problem.

Error Codes and Actions

Error	Description	Corrective Measures
E1	PROGRAM MEMORY ERROR	1. Check Power Supply Voltages 2. Replace Main Logic PCB
E2	INTERNAL RAM ERROR	1. Check Power Supply Voltages 2. Replace Main Logic PCB
E3	EEPROM MEMORY ERROR	1. Check Power Supply Voltages 2. Reprogram, Recalibrate 3. Replace Main Logic PCB
E4	EXTERNAL RAM ERROR	1. Replace Main Logic PCB
E7	A/D CIRCUIT MALFUNCTION OR NO ANALOG LOAD CELL CONNECTED	1. Program for correct load cell type 2. Check load cells and cables 3. Check Power Supply Voltages 4. Replace Main Logic PCB

E8	DigiTOL Load Cell Communication Error	1. Cycle Power 2. Check Load Cells and cables. 3. Check Power Supply voltages 4. Replace Main Logic PCB
E9	DigiTOL Load Cell Out of Range	1. Recalibrate 2. Replace Load Cell
E10	DigiTOL Load Cell RAM Error	1. Cycle Power 2. Check Power Supply voltages 3. Replace Load Cell
E13	DigiTOL Load Cell ROM Error	1. Cycle Power 2. Check Power Supply voltages 3. Replace Main Logic PCB
E16	INTERNAL MATH ERROR	Press Clear to acknowledge, unit will reset.
E20	PREACT VALUE IS GREATER THAN SETPOINT VALUE	Clear preact value, then re-enter setpoint value
E32	INSUFFICIENT TEST WEIGHT USED FOR CALIBRATION	Recalibrate using more test weight
E34	TEST WEIGHT EXCEEDS 105% OF CAPACITY	Use less than 105% of capacity Press CLEAR and re-enter
E35	SPAN CALIBRATION ERROR	Recalibrate. If error persists, check programming or replace load cell.
E36	ANALOG LOAD CELL OUT OF RANGE	1. Recalibrate 2. Replace Load Cell
E50	WEIGHT CAN NOT BE DISPLAYED IN ALTERNATE UNITS	Some alternate units combinations are illegal. Choose another scale build or disable alternate units.
EEE	POSITIVE MORE THAN ZERO CAPTURE LIMIT OF 2% OF SCALE CAPACITY	1. Remove Material from scale base. 2. Disable AZM in setup. 3. Cycle power.
-EEE	NEGATIVE MORE THAN ZERO CAPTURE LIMIT OF 2% OF SCALE CAPACITY	1. Disable AZM in setup. 2. Calibrate Scale. 3. Cycle Power.
------	NO ANALOG LOAD CELL DETECTED	1. Check load cell wiring. 2. Replace Load cell. 3. Replace Main PCB.

AC Power Test

Using a Multi-meter, check the AC input power. Input power must be within -15% and +10% of the nominal AC line voltage.

Main Logic PCB Voltage Test

PANTHER Terminal Analog

Verify voltage of 5.00 VDC between + and - Excitation (±10%). If the PANTHER Terminal has power and there is no excitation voltage, replace the PCB.

PANTHER Terminal DigiTOL

Verify +20 VDC between +20 VDC and ground.

Discrete Output Voltage

With no load applied and the PANTHER Terminal at gross zero, the following voltages should be measured. Refer to the following table for correct voltage readings.

Test Points	Voltage Readings
GND & +5 VDC	5 VDC*
+5 VDC & OUT1	5 VDC*
+5 VDC & OUT2	5 VDC*
+5 VDC & OUT3	5 VDC*

When measuring the higher baud rates in the Demand mode, the meter display will fluctuate for a shorter period of time.

*If voltages are not within the +4.5 to +5.2 VDC range, check for:

- Check wiring. Refer to Chapter 10 Appendix, Discrete Outputs.
- Correct programming.
- Correct setpoint weight values. Refer to the section entitled MEMORY Key Operations—Setpoints in Chapter 4.

RS232 Serial Output Test

Use the following test procedure to determine whether the RS-232 serial port is operational.

1. Remove power from the PANTHER Terminal and the printer and disconnect the data cable from the printer.
2. Set the volt meter to read 20 volts DC.
3. Connect the red lead to pin 2 of the printer end of the data cable and connect the black lead to pin 7.
4. Apply power. The meter should read as follows:
   - In Demand mode, the meter should read between –5 and –15 with no fluctuation.
   - In Continuous mode, the meter should fluctuate between –5 and +5 continuously. The constant fluctuation on the meter display indicates the scale/indicator is transmitting information.

To test Demand baud rates, press the Transact (Print) key. The display should fluctuate between –5 volts to +5 volts for the duration of the transmission, then become stable again. This indicates the terminal has transmitted data.

Analog Output Option

Test the voltages of each output to ground. Depending on the calibration of the scale and the displayed weight, each output should be outputting a linear voltage with respect to calibration. If the voltages are not present or the error code repeats, replace the analog output PCB.

6 PANTHER Terminal Allen-Bradley Option

Allen-Bradley RIO Network Specifications

This section describes the option that permits the PANTHER Terminal to communicate to Allen-Bradley Programmable Logic Controllers (PLCs) through direct connection to the A-B RIO “Blue Hose” network. The option consists of a PANTHER Terminal I/O PCB and software that resides in the PANTHER Terminal, which implements the data exchange.

The PANTHER Terminal A-B RIO PCB has the following features:

Refer to your Allen-Bradley documentation or Allen-Bradley directly for questions related to the A-B RIO network such as cable length, number of nodes, and PLC model compatibility. This manual does not attempt to provide all information pertaining to the Allen-Bradley RIO.

- A-B RIO Node Adapter Chip Set (licensed from Allen-Bradley) and termination for the A-B network cable (blue hose) on a three-position removable terminal block.
- User programmable RIO communication parameters are configured in software set up through the PANTHER Terminal. The parameters are as follows:

  57.6K, 115.2K, or 230.4K baud rate
  rack address
  starting quarter
  last rack designation

- Capability for bi-directional discrete mode communications of weight, display increments, status, and control data between the PLC and PANTHER.

Allen-Bradley Overview

Information on data exchange to and from the Allen-Bradley RIO, and data formats are not made available by Allen-Bradley.

In the "weight-synchronous" communications mode, the PANTHER Terminal initiates a communication exchange with the PLC at every A-to-D weight update. This mode is also known as the Discrete I/O mode in Allen-Bradley terminology. The weight-synchronous communications is a high-speed, real-time message interface between the PANTHER Terminal and PLC for process control.

Allen Bradley RIO Kit Installation

The PANTHER Allen Bradley Option Kit 0971-0251 provides connectivity to an Allen-Bradley PLC using the remote I/O (RIO) protocol. The Allen Bradley Kit may be installed in the PANTHER Harsh Environment or Panel Mount enclosure type.

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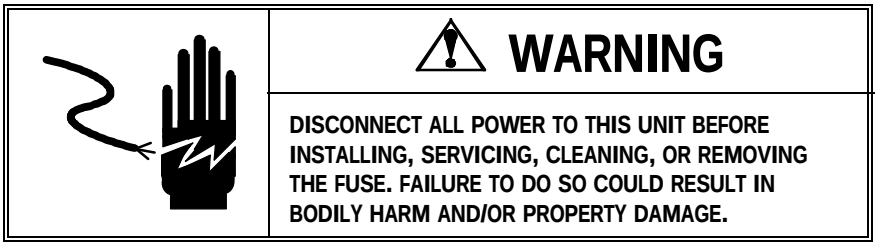
Part Number	Description	Quantity
(*)15098500A	Allen Bradley PCB Assembly	1
(*)14915300A	Option Harness	1
(*)14467400A	Snap-in Standoff	1
(*)14829500A	Mounting Bracket	1
(*)14828800A	Terminal Block Label	1
(*)14828700A	Controller Label, Analog	1
(*)15069600A	Controller Label, Digital	1
(*)14827600A	Rear Panel	1
(*)14217400A	Terminal Block, 3 position	1
R0511100A	Screw, M4	4
R0519600A	Nut, M4	2

(*) May have letter prefix.

Installation in Harsh Environment Enclosure



WARNING!
Do not apply power to the Panther until installation of components and external wiring have been completed.

To install the 0971-0251 AB RIO PCB Kit:

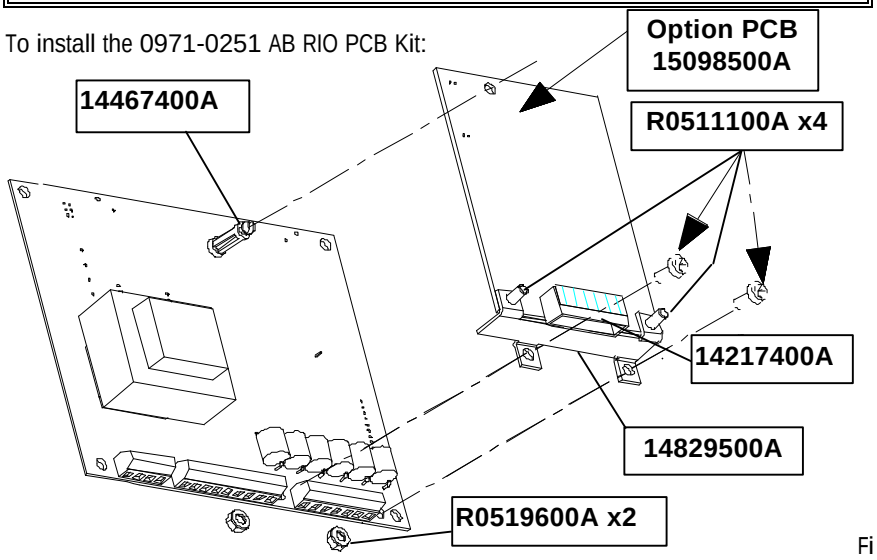
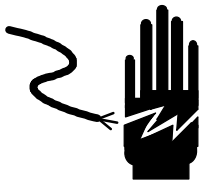


Figure 6-1 Allen-Bradley PCB Installation in Harsh Environment Enclosure

1. First disconnect AC power to the PANTHER Terminal.
2. Locate the two slots found on the bottom of the enclosure lid. Press a large flat bladed screwdriver into the each slot until a gentle "pop" sound is heard, indicating that the latch has released. Swing the bottom of the enclosure cover up until it clears the enclosure. Next lightly squeeze the top of the front cover to the enclosure then raise the cover to clear the upper two spring clips. The cover will swing down and be suspended by a grounding strap.
3. Remove the four screws which mount the Controller PCB to the cover.
4. Press the Snap-In Standoff (14467400A) into the Controller PCB (see Figure 6-1).
5. Attach the Mounting Bracket (14829500A) to the Allen Bradley PCB (15098500A) with 2 screws (R0511100A).
6. Plug the Option Harness (14915300A) to the Allen Bradley PCB at J1.
7. Connect the Option Harness to the Controller PCB at J2.
8. Attach the Allen Bradley Option PCB to the Controller PCB with 2 screws (R0511100A) and 2 nuts (R0519600A).
9. Mount the Controller PCB to the enclosure front cover using the four screws removed in step 3.
10. Insert Terminal Block (14217400A) into Allen Bradley PCB connector and wire interconnecting cable (not supplied with this kit).
11. Close the enclosure, apply power, and program as required. Refer to the Chapter 3 for programming information.

Installation in Panel Mount Enclosure



⚠ WARNING

DISCONNECT ALL POWER TO THIS UNIT BEFORE INSTALLING, SERVICING, CLEANING, OR REMOVING THE FUSE. FAILURE TO DO SO COULD RESULT IN BODILY HARM AND/OR PROPERTY DAMAGE.

CAUTION

OBSERVE PRECAUTIONS FOR HANDLING ELECTROSTATIC SENSITIVE DEVICES.

1. First disconnect AC power to the PANTHER Terminal.
2. Unscrew the two screws (R0511100A) retaining the rear enclosure cover plate, then remove and discard the original cover plate. Save the mounting screws for later.
3. Slide the Controller PCB partially out of the enclosure until the keyboard tail is exposed. Unplug the keyboard tail and remove the Controller PCB from the enclosure.

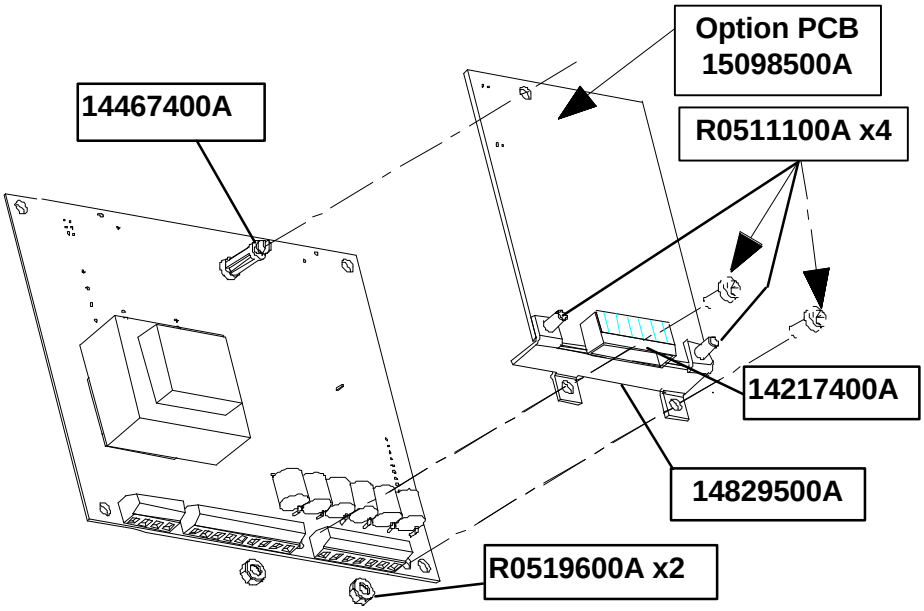


Figure 6-2 Allen-Bradley PCB Installation in Panel Mount Enclosure

4. Press the Snap-In Standoff (14467400A) into the Controller PCB.
5. Attach the Mounting Bracket (14829500A) to the Allen Bradley Option PCB (15098500A) with 2 screws (R0511100A).
6. Connect the Option Harness (14915300A) to the Controller PCB at J2.
7. Attach the Allen Bradley Option PCB to the Controller PCB with 2 screws (R0511100A) and 2 nuts (R0519600A) (Figure 6-3).

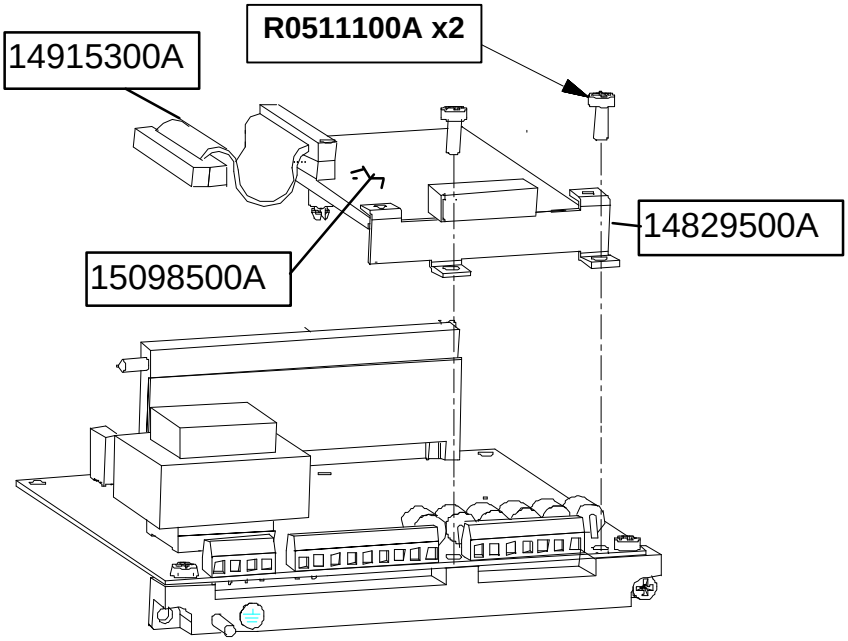


Figure 6-3 Allen-Bradley PCB Installation in Panel Mount Enclosure

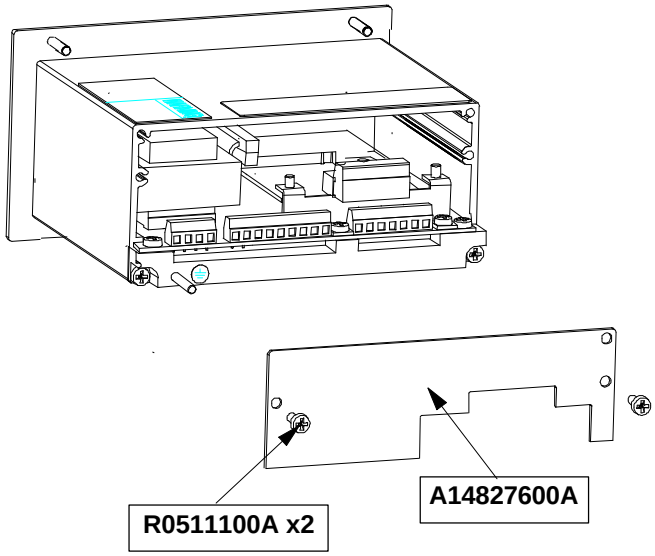


Figure 6-4 Allen-Bradley PCB Installation in Panel Mount Enclosure

8. Plug the Option Harness (14915300A) to the Allen Bradley Option PCB.
9. Plug the keyboard tail into the mating connector on the bottom of the Controller PCB.
10. Slide the Controller PCB assembly into the enclosure. Make sure the keyboard tail does not fold in front of the display.
11. Attach the new Rear Panel (14827600A) to the enclosure using the two screws (R0511100A) removed in step 2.
12. Affix the Controller Label (14828700A Analog or 15069600A Digital) to the Allen Bradley Option Rear Panel to identify the Controller PCB terminals.
13. Insert Terminal Block (14217400A) into the Allen Bradley PCB connector. Affix the Terminal Block.
14. Wire interconnecting cable (not supplied with this kit) to the Terminal Block. Apply power and program as required.

AB RIO Interface PCB Wiring and Specifications

Processor: Allen-Bradley ASIC

Memory: None

I/O: Allen-Bradley RIO network interface
Electrical: centered, transformer isolated line drivers
Connector: Three position removable terminal strip
1 Blue
2 Shield
3 Clear
Bus Interface: Same as Connector PCB

Power Requirements: +5 VDC

PCB Outline: 6.8" x 5.3". 0.50" max height.

Status Lights

The Allen-Bradley option board has a status LED with three modes:

- ON—indicates normal operation
- Flashing—indicates the PLC is in Program Mode
- OFF—indicates a communication problem with the PLC

Allen-Bradley Setup In PANTHER Terminal

To configure the PANTHER Terminal for an Allen-Bradley PCB, first select F8 in setup, then select the following options.

F8.1 Weight Data Type

0 = Weight is in display increments, decimal point is implied.

1 = Weight is in integer divisions, no decimal point implied.

F8.2 Rack Address

Enter 1-64 for the Rack Address.

F8.3 Start Quarter

Enter the starting ¼ rack address 1-4.

F8.4 Last Rack?

0 = No

1 = Yes

F8.5 Data Rate

1 = 57.6Kb

2 = 115.2 Kb

3 = 230.4Kb

Communications

The Allen-Bradley Remote I/O (RIO) network is an Allen-Bradley proprietary network that permits certain A-B PLCs to communicate to additional racks of input and output devices or to other peripheral devices that implement the RIO interface. The network has evolved with generations of A-B PLCs to implement higher speeds and more connections. The PANTHER Terminal utilizes component parts that are provided by A-B thereby assuring complete compatibility with the RIO

network. PANTHER Terminals are recognized as an Allen-Bradley device by the PLC.

Each PANTHER Terminal connected to the RIO network represents a physical node. The connection is facilitated by a three-position removable terminal block on the PANTHER Terminal RIO Option back panel. The terminal block is labeled 1, SHLD, and 2. These terminals correspond to the like terminals on the A-B PLC RIO connector. The wiring between the PLC and the PANTHER Terminal RIO connector uses the standard RIO cable supplied by Allen-Bradley. This cable is often referred to as the "blue hose." The cable installation procedures and specifications are the same as recommended by Allen-Bradley for the RIO network.

Node Address

Although each PANTHER RIO Option represents one physical node, the addressing of the node is defined as a logical rack address. This address is determined by the system designer, then programmed into the PANTHER. Programming is done through the Allen-Bradley program block in setup. Each scale occupies a quarter rack in the RIO address space and the quarter may be defined as the first, second, third, or fourth quarter of a rack. It is also necessary to designate the location of the PLC which is the highest quarter used in a logical rack. PANTHER programming capabilities allow selection of the starting quarter and designation of the last rack.

Controlling PANTHER Terminal Discrete I/O using a PLC interface

Panthers on RIO

- Use Allen-Bradley licensed Technology.
- Looks like an A-B RIO Device.
- Use Standard *Blue Hose* connections.

The PANTHER provides the ability to directly control its discrete outputs and read its discrete inputs via the (digital) PLC interface options. The PANTHER discrete I/O updates are synchronized with the PANTHER A/D rate, not with the PLC I/O scan rate. This may cause a noticeable delay in reading inputs or updating outputs as observed from the PLC to real world signals."

Data Definition

The PANTHER RIO I/O network supports Discrete Data Transfer that allows for bi-directional communication of discrete bit encoded information or 16 bit binary word (signed integer) numerical values. Each PANTHER represents a quarter rack of data to the RIO Option and each quarter rack provides two input (read) and two output (write) words. A quarter logical rack has 32 input bits (two 16 bit words) and 32 output bits (two 16 bit words). The data in these input and output words is formatted as follows:

DISCRETE READ - PANTHER Terminal Output to PLC Input		
Bit Numbers	Word 0[1]	Word 1
0	Integer Weight bit 00	Setpoint 1[5]
1	Integer Weight bit 01	Setpoint 2[6]
2	Integer Weight bit 02	Zero Tolerance[7]
3	Integer Weight bit 03	Unused
4	Integer Weight bit 04	Unused
5	Integer Weight bit 05	Unused
6	Integer Weight bit 06	Unused
7	Integer Weight bit 07	Unused
8	Integer Weight bit 08	Unused
9	Integer Weight bit 09	PAR 1.1[1]
10	Integer Weight bit 10	Unused
11	Integer Weight bit 11	Unused
12	Integer Weight bit 12	Motion[2]
13	Integer Weight bit 13	Net Mode[2]
14	Integer Weight bit 14	Update in Progress[3]
15	Integer Weight bit 15	Data OK[4]

1. PAR 1.1 is the current state of the PANTHER Terminal parallel input.
2. Positive true (1=True)
3. If 1, the PANTHER Terminal was updating the PLC interface shared memory while data was read. The PLC should ignore this data and rescan.
4. Set to 1 if scale is operating properly, not over or under range, in power up, expanded mode, or in setup mode (Integer weight will be set to zero.)
5. Setpoint 1 output bit status if in Setpoint mode or Under bit status if in Over-Under mode.
6. Setpoint 2 output bit status if in Setpoint mode or “Low OK - OK - High OK” bit status if in Over-Under mode.
7. Zero Tolerance output bit status if in Setpoint mode or Over bit status if in Over-Under mode.

DISCRETE WRITE - PLC Output to PANTHER Terminal Input		
Bit Numbers	Word 0	Word 1
0	Integer tare/Setpoint Bit 00	Select 1[1]
1	Integer tare/Setpoint Bit 01	Select 2[1]
2	Integer tare/Setpoint Bit 02	Select 3[1]
3	Integer tare/Setpoint Bit 03	Load Preset Tare[2,7]
4	Integer tare/Setpoint Bit 04	Clear Tare Command[3,8]
5	Integer tare/Setpoint Bit 05	Pushbutton Tare Command[3,7]
6	Integer tare/Setpoint Bit 06	Print Command[3]
7	Integer tare/Setpoint Bit 07	Zero Command[3]
8	Integer tare/Setpoint Bit 08	Enable Setpoint Command[4]
9	Integer tare/Setpoint Bit 09	Unused
10	Integer tare/Setpoint Bit 10	Unused
11	Integer tare/Setpoint Bit 11	Unused
12	Integer tare/Setpoint Bit 12	PAR 2.1[5]
13	Integer tare/Setpoint Bit 13	PAR 2.2[5]
14	Integer tare/Setpoint Bit 14	PAR 2.3[5]
15	Integer tare/Setpoint Bit 15	Load Setpoint 1 Value[6]

1. A binary value in bits 0-2 select the data in Discrete Read weight data source: 0 = Gross weight, 1 = Net weight, 2 = Displayed weight, 3 = Tare or active Target if in Over/Under mode, 4 = Setpoint 1, 5-7 = Gross.
2. A transition from 0 to 1 causes the value in Word 0 to be written into the preset tare register.
3. A transition from 0 to 1 activates the command.
4. Setpoint or Over-Under high level outputs are disabled if this bit is set = 0, enabled if set = 1. Setting this bit to 1 after a downloaded Setpoint 1 or Target 1 value will store the downloaded value in non-volatile memory.
5. PAR2.1 - PAR2.3 are the PANTHER Terminal parallel outputs. Writing a 1 to these bits causes the output to turn on. Output control is only accepted if the PANTHER Terminal is in Indicator mode.
6. A transition from 0 to 1 causes the value in Word 0 to be written into PANTHER Terminal memory, however, the non-volatile memory Setpoint 1 target register (if in Setpoint mode) or Target 1 target register (if in Over-Under mode) will not be updated unless the Enable Setpoint Command bit = 1. The Word 0 value for Setpoint 1 or Target 1 are in the primary unit (calibrated unit).
7. When tare interlocks are set, accumulative tares will not be permitted.
8. When tare interlocks are set, tare can only be cleared at gross zero.

Discrete Data Formats

Discrete Read (PANTHER Terminal output to PLC input)

A/B Addr	17	16	15	14	13	12	11	10	7	6	5	4	3	2	1	0
Word 0 In	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X
Word 1 In	Data OK	Update in Progress	NET	MOT			PAR 1.1							Zero TOL	SP2	SP1

Discrete Write (PLC output to PANTHER Terminal input)

A/B Addr	17	16	15	14	13	12	11	10	7	6	5	4	3	2	1	0
Word 0 Out	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X
Word 1 Out	Load SP1	PAR 2.3	PAR 2.2	PAR 2.1				Enab l SP	ZERO	PRNT	PB TARE	CLR Tare	Load Tare	SEL 3	SEL 2	SEL 1

Discrete Read Word 0 is a sixteen-bit signed integer that represents the weight value of the scale. The three SEL bits of Discrete Write Word 1 determine whether it is gross, net, tare, or displayed weight, or SP1. Discrete Write Word 0 is a sixteen-bit signed integer whose value can be loaded into tare or SP1 depending on the Load SP1 or Load Tare bits in Discrete Write Word 1.

SEL 1-3 represent a binary value to select the data for Discrete Read Word 0.
0= gross weight, 1 = net weight, 2 = displayed weight, 3 = tare weight, 4 = SP1 5-7 = gross weight.

7 PANTHER Terminal PROFIBUS Option

Equipment installed in the field for the automation of technical processes is increasingly using digital microelectronics. Bit serial Fieldbuses are being applied for the communication between these digital field devices and higher level automation components. Currently, a diversity of proprietary networks exists in the Fieldbus area. The use of these networks often results in isolated incompatible solutions. The need for an open, vendor independent communication system led to the specification and standardization of PROFIBUS.

In any Fieldbus standard, many definitions are necessary in order to describe the protocol completely and clearly. The result is a complex standard that seems to be difficult to understand at first sight. Any technical questions about the PROFIBUS Interface should be referred to the German national standard PROFIBUS, DIN 19 245. Information is also available through the PROFIBUS User Organization and on the World Wide Web.

PROFIBUS Overview

This section describes the option that permits the PANTHER Terminal to communicate to a PROFIBUS L2-DP master according to DIN 19 245. The option consists of a module and software that resides in the PANTHER Terminal, which implements the data exchange.

The PANTHER Terminal PROFIBUS PCB interfaces to PLC's such as, Texas Instruments 505 series and Siemens S5-115 series PLCs.

The Texas Instruments (TI) 505 PLCs interface to the PROFIBUS via an I/O processor called a Field Interface Module (FIM). The FIM bus master recognizes a fixed set of PROFIBUS slave devices, all of which are viewed by it as some sort of remote I/O rack. On power up, the FIM queries each PROFIBUS slave node to determine which of the recognized types a device might be and configures itself accordingly. The PANTHER PROFIBUS option appears to the FIM to be a small ET200U I/O rack.

The Siemens S5-115 series PLC also interfaces to the PROFIBUS using an I/O processor, an IM-308, which has no preconceived notions about PROFIBUS devices. This device must be locally programmed with the PANTHER Interface Device Data Base (DDB).

PROFIBUS Kit Installation

The PANTHER Terminal PROFIBUS Option is available as a field installed kit by ordering 0917-0252. The PANTHER Terminal 0917-0252 PROFIBUS Option Kit provides connectivity to an PROFIBUS PLC using the remote I/O (RIO) protocol. The PROFIBUS Kit may be installed in either the PANTHER Terminal Harsh Environment or Panel Mount enclosure type. Included in the kit are the following parts:

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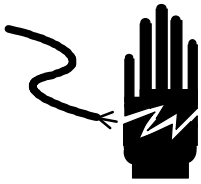
Part Number	Description	Quantity
(*)15166100A	PROFIBUS PCB Assembly	1
(*)14915300A	Option Harness	1
(*)14467400A	Snap-in Standoff	1
(*)14829500A	Mounting Bracket	1
(*)14828700A	Controller Label, Analog	1
(*)15069600A	Controller Label, Digital	1
(*)15174000A	Rear Panel	1
R0511100A	Screw, M4	4
R0519600A	Nut, M4	2

* May have letter prefix.

Installation in Harsh Environment Enclosure



⚠ WARNING

DISCONNECT ALL POWER TO THIS UNIT BEFORE INSTALLING, SERVICING, CLEANING, OR REMOVING THE FUSE. FAILURE TO DO SO COULD RESULT IN BODILY HARM AND/OR PROPERTY DAMAGE.

⚠ CAUTION

OBSERVE PRECAUTIONS FOR HANDLING ELECTROSTATIC SENSITIVE DEVICES.

To install the PROFIBUS Option PCB Kit 0917-0252 in the PANTHER Terminal Harsh Environment Enclosure:

1. First disconnect AC power to the PANTHER Terminal.
2. Locate the two slots found on the bottom of the enclosure lid. Press a large flat bladed screwdriver into the each slot until a gentle "pop" sound is heard, indicating that the latch has released. Swing the bottom of the enclosure cover up until it clears the enclosure. Next lightly squeeze the top of the front cover to the enclosure then raise the cover to clear the upper two spring clips. The cover will swing down and be suspended by a grounding strap.
3. Remove the four screws which mount the Controller PCB to the cover.

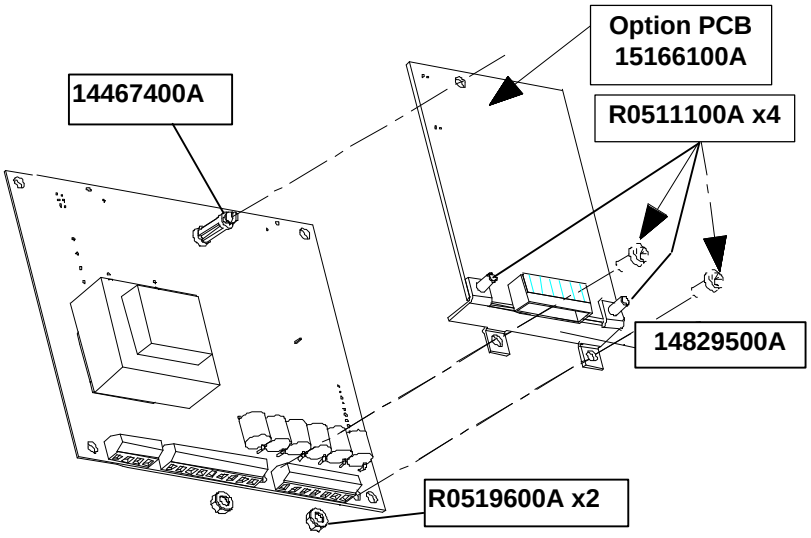
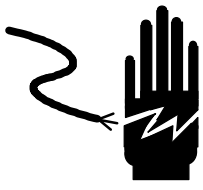


Figure 7-1 Mounting PROFIBUS Option PCB in Harsh Environment Enclosure

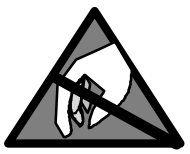
4. Attach the Mounting Bracket (14829500A) to the PROFIBUS Option PCB (15166100A) with 2 screws (R0511100A).
5. Press the Snap-In Standoff (14467400A) into the Controller PCB.
6. Snap the PROFIBUS Option PCB and mounting bracket assembly into place on the Controller PCB.
7. Attach the mounting bracket to the Controller PCB with 2 screws (R0511100A) and 2 nuts (R0519600A).
8. Plug the Option Harness (14915300A) into the PROFIBUS Option PCB at J1.
9. Plug the Option Harness into the Controller PCB at J2.
10. Mount the Controller PCB to the enclosure front cover using the four screws removed in step 3.
11. Route the interconnecting cable (not supplied with this kit) through the unused grip bushing in the enclosure and connect it to the PROFIBUS Option PCB.
12. Close the enclosure, apply power, and program as required. Refer to the PANTHER Terminal Setup section (Chapter 3).

Installation in Panel Mount Enclosure



⚠ WARNING

DISCONNECT ALL POWER TO THIS UNIT BEFORE INSTALLING, SERVICING, CLEANING, OR REMOVING THE FUSE. FAILURE TO DO SO COULD RESULT IN BODILY HARM AND/OR PROPERTY DAMAGE.



⚠ CAUTION

OBSERVE PRECAUTIONS FOR HANDLING ELECTROSTATIC SENSITIVE DEVICES.

To install the PROFIBUS Option PCB Kit 0917-0252 in the PANTHER Terminal Panel Mount Enclosure:

1. First disconnect AC power to the PANTHER Terminal.
2. Unscrew the two screws (R0511100A) retaining the rear enclosure cover plate, then remove and discard the original cover plate. Save the mounting screws for later.
3. Unscrew the two screws holding Controller PCB. Slide the Controller PCB part way out of the enclosure until the keyboard tail is exposed. Unplug the keyboard tail and remove the Controller PCB from the enclosure.

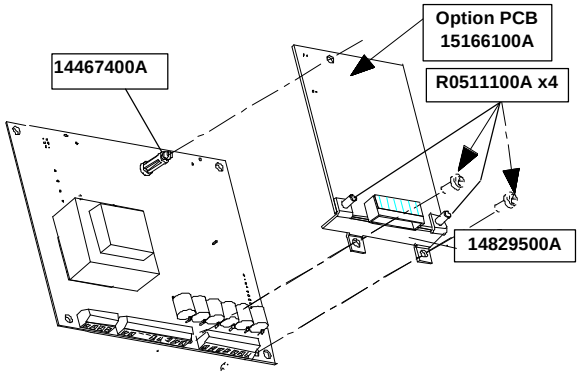


Figure 7-2 Mounting PROFIBUS Option PCB in Panel Mount Enclosure

4. Attach the mounting bracket (14829500A) to the PROFIBUS Option PCB (15166100A) with 2 screws (RO511100A).
5. Press the Snap-In Standoff (14467400A) into the Controller PCB.
6. Snap the PROFIBUS Option PCB and mounting bracket into place on the Controller PCB.
7. Attach the mounting bracket to the Controller PCB with 2 screws (R0511100A).
8. Plug the Option Harness into the Controller PCB at J2. (Fold Harness 90° to make connection to J2.)

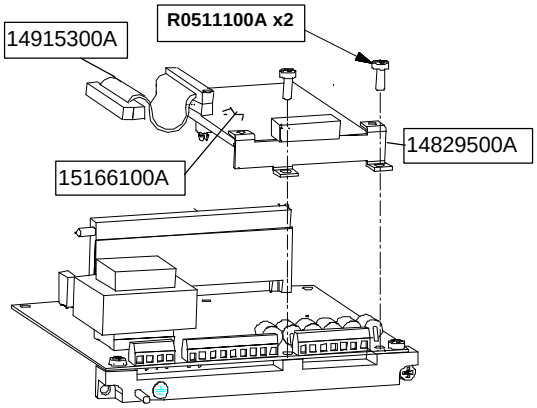


Figure 7-3 Installation in Panel Mount Enclosure

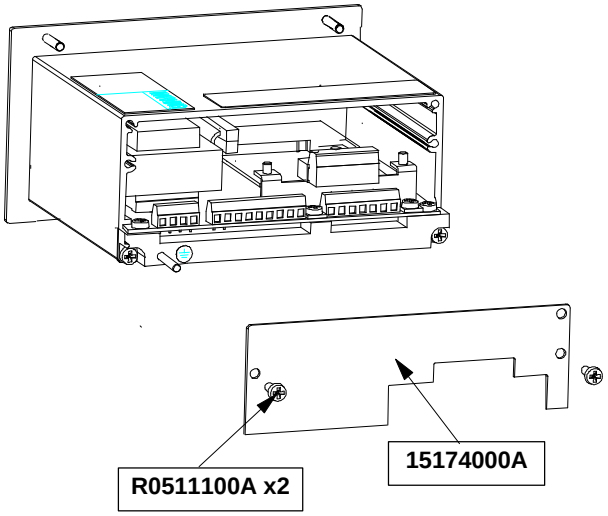


Figure 7-4 Installation in Panel Mount Enclosure

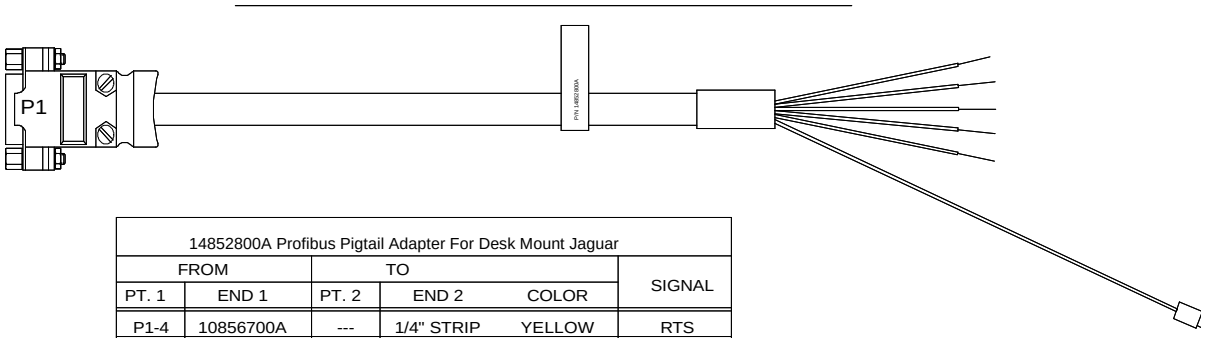
9. Plug the Option Harness into the PROFIBUS Option PCB.
10. Plug the keyboard tail into the mating connector on the Controller PCB.
11. Slide the Controller PCB assembly into the enclosure. Make sure the keyboard tail does not fold in front of the display. Attach Controller PCB to unit with the two screws removed in step 3.
12. Attach the new Rear Panel (15174000A) to the enclosure using the two screws (R0511100A) removed in step 2.
13. Affix the appropriate Controller Label (14828700A Analog or 15069600A Digital) to the PROFIBUS Option Rear Panel to identify the Controller PCB terminals. (Use the one that matches the label from the original rear panel.)
14. Attach interconnecting cable (not supplied with this kit) to the PROFIBUS Option PCB. Apply power and program as required.

Wiring

The PROFIBUS connection is available at two locations on the PROFIBUS PCB. The first is a female 9 pin D subminiature connector, which is the PROFIBUS standard connection. The field connector assembly is not supplied by METTLER TOLEDO. This connection is the preferred connection in PANTHER Panel Mount (PTPN). For the PANTHER Harsh Environment (PTHN), the pluggable terminal strip must be used. In these cases, a pigtail harness is available to wire from the terminal strip to a female 9-pin D connector.

Female DE-9	1 GND (isolated)
	2 N.C.
	3 TX/RX+
	4 RTS
	5 GND (isolated)
	6 +5V (isolated)
	7 N.C.
	8 TX/RX-
	9 N.C.
Terminal strip	1 RTS
	2 TXD/RXD+
	3 TXD/RXD-
	4 +5 V (isolated)
	5 GND (isolated)

When using the PANTHER Harsh Environment, a Pigtail Adapter Harness is required in order to install the front cover on the PANTHER. The Adapter harness can be ordered using factory number 0900-0311. The adapter is shown here.



14852800A Profibus Pigtail Adapter For Desk Mount Jaguar					
FROM		TO			SIGNAL
PT. 1	END 1	PT. 2	END 2	COLOR	
P1-4	10856700A	---	1/4" STRIP	YELLOW	RTS
P1-8	10856700A	---	1/4" STRIP	BLUE	COM A
P1-3	10856700A	---	1/4" STRIP	GREEN	COM B
P1-6	10856700A	---	1/4" STRIP	RED	+5V
P1-5	10856700A	---	1/4" STRIP	BLACK	GND
1G	12471400A	DRAIN	SOLDER	GREEN	DRAIN

PROFIBUS Setup in PANTHER Terminal

To configure the PANTHER for a PROFIBUS PCB, select F8 in setup, then select the following options.

F8.1 Weight Data Type

0 = Weight is in display increments, decimal point is implied.

1 = Weight is in integer divisions, no decimal point implied.

F8.2 Rack Address

Enter 0-126 for the Rack Address.

Data Definition

The PANTHER PROFIBUS PLC Interface supports Discrete Data Transfer that allows for bi-directional communication of discrete bit encoded information or 16 bit binary word (signed integer) numerical values. Each PANTHER represents a quarter rack of data to the PLC Option and each quarter rack provides two input (read) and two output (write) words. A quarter logical rack has 32 input bits (two

16 bit words) and 32 output bits (two 16 bit words). The data in these input and output words is formatted as follows:

DISCRETE READ - PANTHER TERMINAL Output to PLC Input		
Bit Numbers	Word 0[1]	Word 1
0	Integer Weight bit 00	Setpoint 1[5]
1	Integer Weight bit 01	Setpoint 2[6]
2	Integer Weight bit 02	Zero Tolerance[7]
3	Integer Weight bit 03	Unused
4	Integer Weight bit 04	Unused
5	Integer Weight bit 05	Unused
6	Integer Weight bit 06	Unused
7	Integer Weight bit 07	Unused
8	Integer Weight bit 08	Unused
9	Integer Weight bit 09	PAR 1.1[1]
10	Integer Weight bit 10	Unused
11	Integer Weight bit 11	Unused
12	Integer Weight bit 12	Motion[2]
13	Integer Weight bit 13	Net Mode[2]
14	Integer Weight bit 14	Update in Progress[3]
15	Integer Weight bit 15	Data OK[4]

1. PAR 1.1 is the current state of the PANTHER Terminal parallel input.
2. Positive true (1=True)
3. If 1, the PANTHER Terminal was updating the PLC interface shared memory while data was read. The PLC should ignore this data and rescan.
4. Set to 1 if scale is operating properly, not over or under range, in power up, expanded mode, or in setup mode (Integer weight will be set to zero.)
5. Setpoint 1 output bit status if in Setpoint mode or Under bit status in Over-Under mode.
6. Setpoint 2 output bit status if in Setpoint mode or “Low OK - OK - High OK” bit status if in Over-Under mode.
7. Zero Tolerance output bit status if in Setpoint mode or Over bit status if in Over-Under mode.

DISCRETE WRITE - PLC Output to PANTHER TERMINAL Input		
Bit Numbers	Word 0	Word 1
0	Integer tare/Setpoint Bit 00	Select 1[1]
1	Integer tare/Setpoint Bit 01	Select 2[1]
2	Integer tare/Setpoint Bit 02	Select 3[1]
3	Integer tare/Setpoint Bit 03	Load Preset Tare[2,7]
4	Integer tare/Setpoint Bit 04	Clear Tare Command[3,8]
5	Integer tare/Setpoint Bit 05	Pushbutton Tare Command[3,7]
6	Integer tare/Setpoint Bit 06	Print Command[3]
7	Integer tare/Setpoint Bit 07	Zero Command[3]
8	Integer tare/Setpoint Bit 08	Enable Setpoint Command[4]
9	Integer tare/Setpoint Bit 09	Unused
10	Integer tare/Setpoint Bit 10	Unused
11	Integer tare/Setpoint Bit 11	Unused
12	Integer tare/Setpoint Bit 12	PAR 2.1[5]
13	Integer tare/Setpoint Bit 13	PAR 2.2[5]
14	Integer tare/Setpoint Bit 14	PAR 2.3[5]
15	Integer tare/Setpoint Bit 15	Load Setpoint 1 Value[6]

1. A binary value in bits 0-2 select the data in Discrete Read weight data source: 0 = Gross weight, 1 = Net weight, 2 = Displayed weight, 3 = Tare or active Target if in Over/Under mode, 4 = Setpoint 1, 5-7 = Gross.
2. A transition from 0 to 1 causes the value in Word 0 to be written into the preset tare register.
3. A transition from 0 to 1 activates the command.
4. Setpoint or Over-Under high level outputs are disabled if this bit is set = 0, enabled if set = 1. Setting this bit to 1 after a downloaded Setpoint 1 or Target 1 value will store the downloaded value in non-volatile memory.
5. PAR2.1 - PAR2.3 are the PANTHER Terminal parallel outputs. Writing a 1 to these bits causes the output to turn on. Output control is only accepted if the PANTHER Terminal is in Indicator mode.
6. A transition from 0 to 1 causes the value in Word 0 to be written into PANTHER Terminal memory, however, the non-volatile memory Setpoint 1 target register (if in Setpoint mode) or Target 1 target register (if in Over-Under mode) will not be updated unless the Enable Setpoint Command bit = 1. The Word 0 value for Setpoint 1 or Target 1 are in the primary unit (calibrated unit).
7. When tare interlocks are set, accumulative tares will not be permitted.
8. When tare interlocks are set, tare can only be cleared at gross zero.

8 PANTHER Terminal Modbus Plus Option

Modbus Plus Overview

PANTHER and METTLER TOLEDO are registered trademarks of Mettler-Toledo, Inc.

Modbus Plus, Modicom, Telemechenique, and Square D are trademarks of Schneider Automation, Inc., North Andover, MA

Modbus Plus is a local area network designed for industrial control applications. The network enables Modicon Model 984 programmable controllers, host computers, PANTHER Terminals, and other devices to communicate throughout the production areas of an industrial plant. It supports 64 addressable node devices at data transfer rates of one million bits per second. Up to 32 devices can connect directly to a network cable with a length of up to 1500 feet.

The PANTHER Modbus Plus Interface is an option card that plugs into the PANTHER. It has an 80C152 "Peer Processor" that implements the network protocol; a 1K Dual Port RAM that is the data path to the PANTHER controller card; an FM Encoder/Decoder; and an RS485 driver that provides the interface to the Modbus Plus network.

The PANTHER is a single Modbus Plus node. Point-to-point communication in the Modbus Plus network is the communication between two network nodes. The "Master Task" at the initiating node generates a "transaction query" for the "Slave Command Handler Task" at the destination node. The Slave Command Handler Task sends a "transaction response" to the transaction query. Peer Processors route the messages through the network. The Modicon 984 PLC acts as the Master Task, and the PANTHER has the Slave Command Handler Task. The PLC initiates all transactions, and the PANTHER responds to the transaction queries. The general format for Modbus transaction query command is a one-byte command followed by a group of bytes. The maximum length is 252 bytes. The function bytes tell the slave device what action to perform.

The PANTHER supports the following Modbus functions:

03 Read Holding Registers. Requests the value of one or more 16-bit holding registers.

16 Preset Multiple Registers. Places values into a series of consecutive holding registers. The transaction query messages contain register values that specify what data that the PLC is requesting from the PANTHER. For example, if the PLC issues Function 03, the data field must contain information telling the PANTHER which register to start at and how many registers to read. All address references within the Modbus messages are relative to zero. For example, the first holding register in the Modicon 984 PLC is 40001, but has the value 0000 in the messages.

Modbus Plus Kit Installation

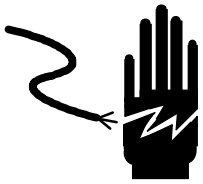
The PANTHER Modbus Plus Option Kit provides connectivity to an Modbus Plus PLC using the remote I/O (RIO) protocol. The Modbus Plus Kit may be installed in

either the PANTHER Harsh Environment or Panel Mount enclosure. Included in the kit are the following parts:

Part Number	Description	Quantity
(*)15165700A	Modus Plus PCB Assembly	1
(*)14915300A	Option Harness	1
(*)14467400A	Snap-in Standoff	1
(*)14829500A	Mounting Bracket	1
(*)14828700A	Controller Label, Analog	1
(*)15069600A	Controller Label, Digital	1
(*)15174000A	Rear Panel	1
R0511100A	Screw, M4	4
R0519600A	Nut, M4	2

(*) May have letter prefix.

Installation in Harsh Environment Enclosure



WARNING

DISCONNECT ALL POWER TO THIS UNIT BEFORE INSTALLING, SERVICING, CLEANING, OR REMOVING THE FUSE. FAILURE TO DO SO COULD RESULT IN BODILY HARM AND/OR PROPERTY DAMAGE.

CAUTION

OBSERVE PRECAUTIONS FOR HANDLING ELECTROSTATIC SENSITIVE DEVICES.

To install the Modbus Plus Option PCB Kit 0917-0253 in the PANTHER Terminal Harsh Environment Enclosure:

1. First disconnect AC power to the PANTHER Terminal.
2. Locate the two slots on the bottom of the enclosure lid. Press a large flat bladed screwdriver into the each slot until a gentle "pop" sound is heard, indicating the latch has released. Swing the bottom of the enclosure cover up until it clears the enclosure. Lightly squeeze the top of the front cover to the enclosure. Raise the cover to clear the upper two spring clips. The cover will swing down and be suspended by a grounding strap.
3. Remove the four screws which mount the Controller PCB to the cover.

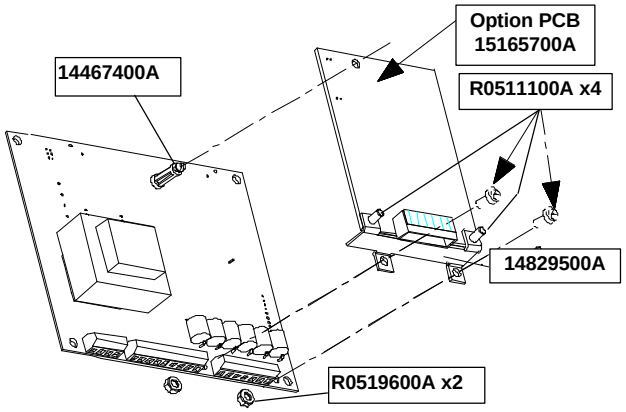
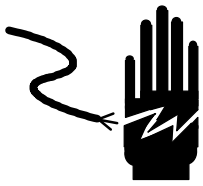


Figure 8-1 Mounting Modbus Plus Option PCB in Harsh Environment Enclosure

4. Attach the Mounting Bracket (14829500A) to the Modbus Plus Option PCB (15165700A) with 2 screws (R0511100A). See Figure 8-1.
5. Press the Snap-In Standoff (14467400A) into the Controller PCB.
6. Snap the Modbus Plus Option PCB and mounting bracket into place on the controller PCB.
7. Attach the mounting bracket to the Controller PCB with 2 screws (R0511100A) and 2 nuts (R0519600A).
8. Plug the Option Harness (14915300A) into the Modbus Plus Option PCB at J1.
9. Plug the Option Harness into the Controller PCB at J2.
10. Mount the Controller PCB to the enclosure front cover using the four screws removed in step 3.
11. Route the interconnecting cable (not supplied with this kit) through the unused grip bushing in the enclosure and connect it to the Modus Plus Option PCB.
12. Close the enclosure, apply power, and program as required.
13. Enter Setup and configure the Modbus Plus options (Refer to Chapter 3).

Installation in Panel Mount Enclosure



WARNING

DISCONNECT ALL POWER TO THIS UNIT BEFORE INSTALLING, SERVICING, CLEANING, OR REMOVING THE FUSE. FAILURE TO DO SO COULD RESULT IN BODILY HARM AND/OR PROPERTY DAMAGE.

CAUTION

OBSERVE PRECAUTIONS FOR HANDLING ELECTROSTATIC SENSITIVE DEVICES.

To install the Modbus Plus Option PCB Kit 0917-0253 in the PANTHER Terminal Panel Mount Enclosure:

1. First disconnect AC power to the PANTHER Terminal.
2. Unscrew the two screws (R0511100A) retaining the rear enclosure cover plate, then remove and discard the original cover plate. Save the mounting screws for later.
3. Unscrew the two screws holding Controller PCB. Slide the Controller PCB part way out of the enclosure until the keyboard tail is exposed. Unplug the keyboard tail and remove the Controller PCB from the enclosure.

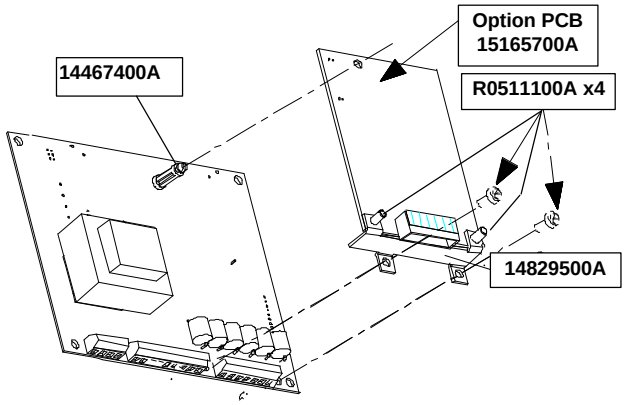


Figure 8-2 Mounting Modbus Plus Option PCB in Panel Mount Enclosure

4. Attach the mounting bracket (14829500A) to the Modbus Plus Option PCB (15165700A) with 2 screws (R0511100A). See Figure 8-2.
5. Press the Snap-In Standoff (14467400A) into the Controller PCB.
6. Snap the Modbus Plus Option PCB and mounting bracket into place on the Controller PCB.
7. Attach the mounting bracket to the Controller PCB with 2 screws (R0511100A). See Figure 8-3.
8. Plug the Option Harness (14915300A) into the Controller PCB at J2.

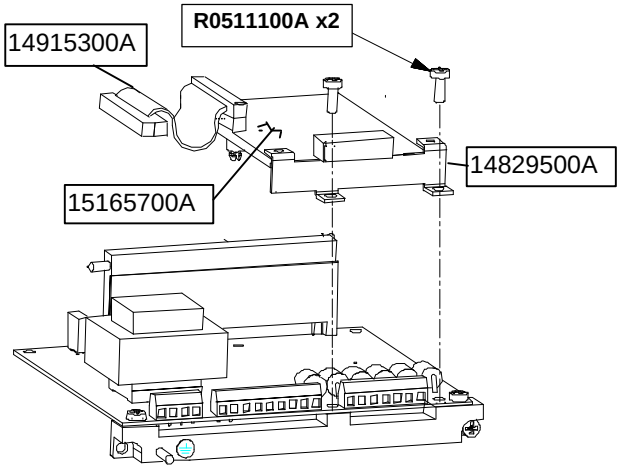


Figure 8-3 Installation in Panel Mount Enclosure

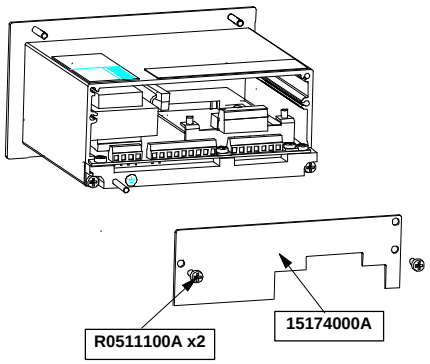


Figure 8-4 Installation in Panel Mount Enclosure

9. Plug the Option Harness into the Modbus Plus Option PCB at J1. (Fold Harness 90° to make connection to J2.)
10. Plug the keyboard tail into the mating connector on the Controller PCB.
11. Slide the Controller PCB assembly into the enclosure. Make sure the keyboard tail does not fold in front of the display. Attach Controller PCB to unit with the two screws removed in step 3.
12. Attach the new Rear Panel (15174000A) to the enclosure using the two screws (R0511100A) removed in step 2. See Figure 8-4.
13. Affix the appropriate Controller Label (14828700A Analog or 15069600A Digital) to the Modbus Plus Option Rear Panel to identify the Controller PCB terminals. (Use the one that matches the label from the original rear panel.)
14. Attach interconnecting cable (not supplied with this kit) to the Modbus Plus Option PCB. Apply power and program as required.
15. Enter Setup and configure the Modbus Plus options (Refer to Modbus Plus Setup in PANTHER Terminal).

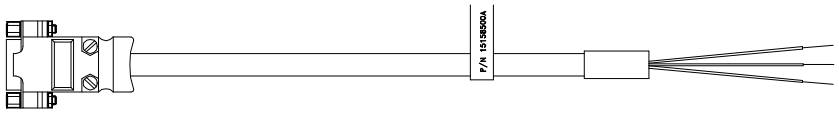
Wiring to PANTHER Terminal

The Modbus Plus network uses pins 1, 2, and 3 of the DE-9 connector, supplied by Modicon. Wiring instructions come with the connector.

The Modbus Plus pigtail is wired to the PANTHER Terminal as follows:

DE-9		Terminal strip
1	Red	1
2	Clear	2
3	Black	3

There are two connections for the Modbus Plus Interface. The standard connection for the PANTHER Terminal Panel Mount is the DE-9 Female Connector. The PANTHER Terminal Harsh Environment must use a plugable terminal strip. When the terminal strip is used, the Modbus Pigtail Cable kit 0900-0320 is available. The 0900-0320 Pigtail Cable is shown below.



WIRE TERMINATION LIST					
FROM		TO		CONDUCTOR	
POINT 1	END 1	POINT 1	END 1	MATERIAL	COLOR
P1–1	10856700A	---	1/4" STRIP	14215700A	WHITE
P1–3	10856700A	---	1/4" STRIP	14215700A	BLACK
P1–2	10856700A	---	SOLDER	14215700A	DRAIN
1G	1/4" STRIP			14191600A	GREEN

Modbus Plus Setup in PANTHER Terminal

To configure the PANTHER Terminal for a Modbus Plus PCB, first select F8 in setup, then select the following options.

F8.1 Weight Data Type

0 = Weight is in display increments, decimal point is implied.
1 = Weight is in integer divisions, no decimal point implied.

F8.2 Enter 1-64 for rack address.

F8.6 Global Data

0 = Global Data Disabled
1 = Global Data Enabled

Discrete Read/Write Format

The PANTHER Terminal can communicate weight to the PLC in a discrete integer weight format. The Modbus Plus uses Discrete Data Transfer that allows for bi-directional communication of discrete bit encoded information or 16-bit binary word (signed integer) numerical values.

On Modbus Plus, there are two words (32 bits) of input data for each scale and two words of output data for each scale.

The Modicon PLC uses these holding registers assignments to request integer weight and scale status from the PANTHER Terminal.

40001 Scale 1 Integer Weight
40002 Scale 1 Status

The Modicon PLC uses these holding registers assignments to send "bit-oriented" commands and associated integer values to the PANTHER Terminal.

40009 Scale 1 Integer Tare or Setpoint Value
40010 Scale 1 Bit-Oriented Commands

Data Definition

The PANTHER Modbus Plus PLC Interface supports **Discrete Data Transfer** that allows for bi-directional communication of discrete bit encoded information or 16 bit binary word (signed integer) numerical values. Each PANTHER represents a quarter rack of data and each quarter rack provides two input (read) and two output (write) words. A quarter logical rack has 32 input bits (two 16 bit words) and 32 output bits (two 16 bit words). The data is formatted as follows:

DISCRETE READ - PANTHER Output to PLC Input		
Bit Numbers	Word 0[1]	Word 1
0	Integer Weight bit 00	Setpoint 1[5]
1	Integer Weight bit 01	Setpoint 2[6]
2	Integer Weight bit 02	Zero Tolerance[7]
3	Integer Weight bit 03	Unused
4	Integer Weight bit 04	Unused
DISCRETE READ - PANTHER Output to PLC Input		
Bit Numbers	Word 0[1]	Word 1
5	Integer Weight bit 05	Unused
6	Integer Weight bit 06	Unused
7	Integer Weight bit 07	Unused
8	Integer Weight bit 08	Unused
9	Integer Weight bit 09	PAR 1.1[1]
10	Integer Weight bit 10	Unused
11	Integer Weight bit 11	Unused
12	Integer Weight bit 12	Motion[2]
13	Integer Weight bit 13	Net Mode[2]
14	Integer Weight bit 14	Update in Progress[3]
15	Integer Weight bit 15	Data OK[4]

1. PAR 1.1 is the current state of the PANTHER Terminal parallel input.
2. Positive true (1=True)
3. If 1, the PANTHER Terminal was updating the PLC interface shared memory while data was read. The PLC should ignore this data and rescan.
4. Set to 1 if scale is operating properly, not over or under range, in power up, expanded mode, or in setup mode (Integer weight will be set to zero.)
5. Setpoint 1output bit status in Setpoint mode; Under bit status if in Over-Under mode.
6. Setpoint 2 output bit status if in Setpoint mode or “Low OK - OK - High OK” bit status if in Over-Under mode.
7. Zero Tolerance output bit status in Setpoint mode; Over bit status in Over-Under mode.

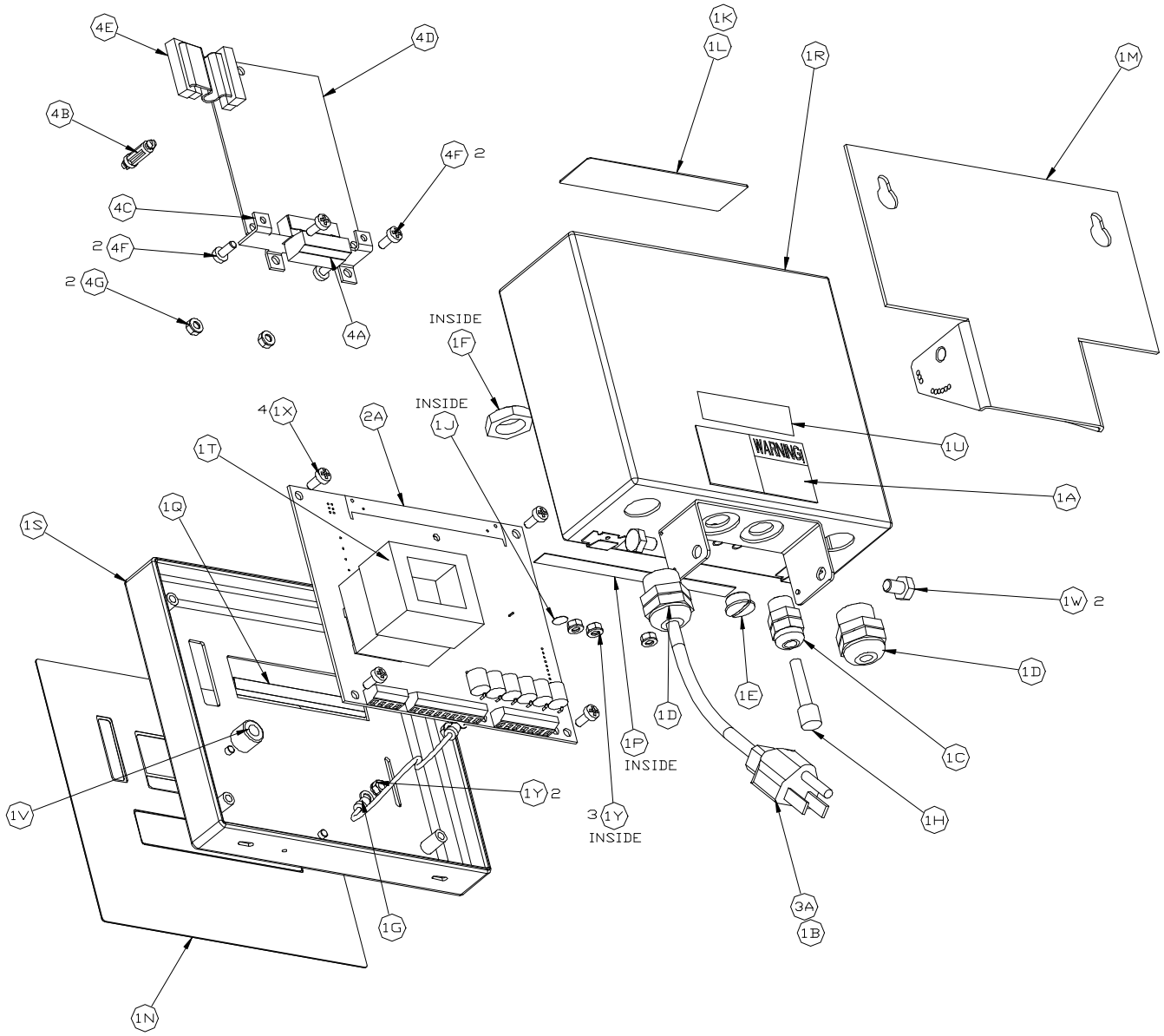
DISCRETE WRITE - PLC Output to PANTHER Input		
Bit Numbers	Word 0	Word 1
0	Integer tare/Setpoint Bit 00	Select 1[1]

1	Integer tare/Setpoint Bit 01	Select 2[1]
2	Integer tare/Setpoint Bit 02	Select 3[1]
3	Integer tare/Setpoint Bit 03	Load Preset Tare[2,7]
4	Integer tare/Setpoint Bit 04	Clear Tare Command[3,8]
5	Integer tare/Setpoint Bit 05	Pushbutton Tare Command[3,7]
6	Integer tare/Setpoint Bit 06	Print Command[3]
7	Integer tare/Setpoint Bit 07	Zero Command[3]
8	Integer tare/Setpoint Bit 08	Enable Setpoint Command[4]
9	Integer tare/Setpoint Bit 09	Unused
10	Integer tare/Setpoint Bit 10	Unused
11	Integer tare/Setpoint Bit 11	Unused
12	Integer tare/Setpoint Bit 12	PAR 2.1[5]
13	Integer tare/Setpoint Bit 13	PAR 2.2[5]
14	Integer tare/Setpoint Bit 14	PAR 2.3[5]
15	Integer tare/Setpoint Bit 15	Load Setpoint 1 Value[6]

1. A binary value in bits 0-2 select the data in Discrete Read weight data source: 0 = Gross weight, 1 = Net weight, 2 = Displayed weight, 3 = Tare or active Target if in Over/Under mode, 4 = Setpoint 1, 5-7 = Gross.
2. A transition from 0 to 1 causes the value in Word 0 to be written into the preset tare register.
3. A transition from 0 to 1 activates the command.
4. Setpoint or Over-Under high level outputs are disabled if this bit is set = 0, enabled if set = 1. Setting this bit to 1 after a downloaded Setpoint 1 or Target 1 value will store the downloaded value in non-volatile memory.
5. PAR2.1 - PAR2.3 are the PANTHER Terminal parallel outputs. Writing a 1 to these bits causes the output to turn on. Output control is only accepted if the PANTHER Terminal is in Indicator mode.
6. A transition from 0 to 1 causes the value in Word 0 to be written into PANTHER Terminal memory, however, the non-volatile memory Setpoint 1 target register (if in Setpoint mode) or Target 1 target register (if in Over-Under mode) will not be updated unless the Enable Setpoint Command bit = 1. The Word 0 value for Setpoint 1 or Target 1 are in the primary unit (calibrated unit).
7. When tare interlocks are set, accumulative tares will not be permitted.
8. When tare interlocks are set, tare can only be cleared at gross zero.

9 Parts and Accessories

Harsh Enclosure



Consists of: (Common Parts)

Sym	Qty	Part Number	Description
1A	1	A12237300A	LABEL, WARNING-POWER
1B	1	12471400A	TERMINAL. #2 RING
1C	1	12901800A	BUSHING, CORD W/ NUT .11 - .25
1D	2	13002300A	BUSHING, CORD W/ NUT .11 - .25
1E	1	14399900A	HOLE PLUG, PG7
1F	1	14577900A	HEX NUT, PG7
1G	1	15048200A	GROUND HARNESS
1H	1	14467600A	HOLE PLUG, .24/.38 DIA.
1J	1	14531400A	LABEL, GROUND BSI
1K	1	14800000A	LABEL, DATA
1L	1	14801800A	SHIELD, LABEL
1M	1	14826100A	BRACKET, MOUNTING
1N	1	14826200A	KEYBOARD ASSEMBLY
1P	1	14828700A	LABEL, CONTROLLER I/O
1Q	1	14830600A	LEGEND PLATE, CURSOR
1R	1	14829300A	ENCLOSURE ASSEMBLY
1S	1	A14829400A	FRONT COVER ASSEMBLY
1T	1	14829600A	DAMPER PAD, TRANSFORMER
1U	1	D11397100A	LABEL, FCC
1V	1	14830500A	RUBBER FOOT
1W	2	R02072020	SCREW, 1/4-20 X .38 HEX HEAD STAINLESS STEEL
1X	4	R0511100A	SCREW, M4 X 10 PH PAN HEAD
1Y	5	R0519600A	HEX NUT, M4 W/ LOCKWASHER

Add for Scale Option (PTHN-1XXX-XXX)

2A	1	(*)14865200A	PCB ASSEMBLY, MAIN ANALOG LOAD CELL
	1	(*)14977900A	PCB ASSEMBLY, MAIN DigiTOL LOAD CELL

Add for Power Cord

3A	1	14501500A	LINE CORD, NORTH AMERICA
	1	14503200A	LINE CORD, CONTINENTAL EUROPE
	1	A13894700A	LINE CORD, U.K./IRELAND
	1	14053000A	LINE CORD, AUSTRALIA
	1	14202800A	LINE CORD, CHILE (ITALY)

Add for Analog Output Interface Option (PTHN-X8XX-XXX)

4A	1	13162500A	CONNECTOR PLUG, 6 POS. ANALOG OUTPUT
4B	1	14467400A	SPACER, SNAP-IN 5/8”
4C	1	14829500A	MOUNTING BRACKET
4D	1	14882700A	PCB ASSEMBLY, ANALOG OUTPUT
4E	1	14915300A	HARNESS, OPTION
4F	4	R0511100A	SCREW, M4 X 10 PH PAN
4G	2	R0519600A	NUT, HEX M4 W/ LOCKWASHER

(*) May have revision letter prefix.

Add for Modbus Plus Interface Option (PTHN-X5XX-XXX)

4B	1	14467400A	STANDOFF, SNAP-IN 5/8"
4C	1	14829500A	MOUNTING BRACKET
4D	1	15165700A	PCB ASSEMBLY, MODBUS PLUS OPTION
4E	1	14915300A	HARNESS, OPTION
4F	4	R0511100A	SCREW, M4 X 10 PH PAN
4G	2	R0519600A	NUT, HEX M4 W/ LOCKWASHER

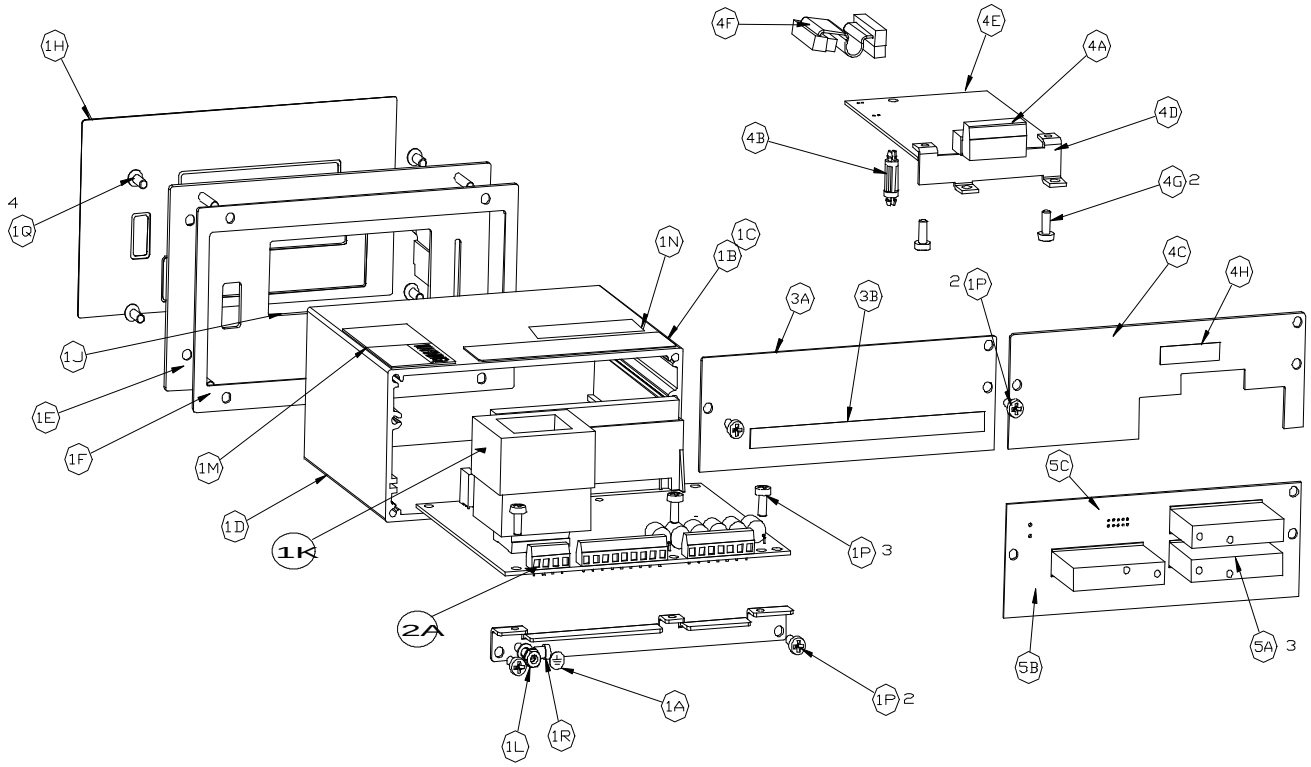
Add for Allen Bradley Interface Option (PTHN-X6XX-XXX)

4A	1	14217400A	TERMINAL BLOCK, 3 POSITION
4B	1	14467400A	STANDOFF, SNAP-IN 5/8"
4C	1	14829500A	MOUNTING BRACKET
4D	1	15098500A	PCB ASSEMBLY, ALLEN BRADLEY RIO OPTION
4E	1	14915300A	HARNESS, OPTION
4F	4	R0511100A	SCREW, M4 X 10 PH PAN
4G	2	R0519600A	NUT, HEX M4 W/ LOCKWASHER

Add for PROFIBUS Interface Option (PTHN-X9XX-XXX)

4B	1	14467400A	STANDOFF, SNAP-IN 5/8"
4C	1	14829500A	MOUNTING BRACKET
4D	1	15166100A	PCB ASSEMBLY, PROFIBUS OPTION
4E	1	14915300A	HARNESS, OPTION
4F	4	R0511100A	SCREW, M4 X 10 PH PAN
4G	2	R0519600A	NUT, HEX M4 W/ LOCKWASHER

Panel Mount Enclosure



Consists of: (Common Parts)

Sym	Qty	Part Number	Description
1A	1	14531400A	LABEL, GROUND BSI
1B	1	14800000A	LABEL, DATA
1C	1	14801800A	LABEL SHIELD
1D	1	14827100A	ENCLOSURE
1E	1	14827200A	FRONT PANEL ASSEMBLY
1F	1	14827300A	GASKET, FRONT PANEL
1G	1	14827400A	BRACKET, CONTROLLER BOARD
1H	1	14828300A	KEYBOARD ASSEMBLY
1J	1	A14829100A	LEGEND PLATE, CURSOR
1K	1	14829600A	DAMPER PAD, TRANSFORMER
1L	1	R0159600A	NUT, HEX M4 W/ LOCKWASHER
1M	1	A12237300A	LABEL, WARNING POWER
1N	1	D11397100A	LABEL, FCC
1P	7	R0511100A	SCREW, M4 X 10 PH PAN
1Q	4	R0529400A	SCREW, M4 X 10 FL HD POZID.
1R	1	12471500A	TERMINAL, #8 RING
(*)	3	R0510000A	SCREW, M4 X 10 HD. DRILLED
(*)	4	R0519600A	NUT, HEX M4 X 10 W/ LOCKWASHER

Add for Scale Option (PTPN-1XXX-XXX)

2A	1	(*)14865400A	PCB ASSEMBLY, MAIN, ANALOG LOAD CELL
	1	(*)15031800A	PCB ASSEMBLY, MAIN, DigiTOL LOAD CELL

Add for Power Cord

3A	1	14827500A	REAR PANEL, BASIC
3B	1	14828700A	LABEL, CONTROLLER I/O

Add for Analog Option (PTPN-X8XX-XXX)

3B	1	14828700A	LABEL, CONTROLLER I/O
4A	1	14162500A	CONNECTOR, TERM. BLOCK 6 POS.
4B	1	14467400A	SPACER, 5/8" SNAP IN
4C	1	14827600A	REAR PANEL, ANALOG OUTPUT
4D	1	14829500A	MOUNTING BRACKET
4E	1	14882700A	PCB ASSEMBLY, ANALOG BOARD
4F	2	14915300A	HARNESS, OPTION
4G	1	R0511100A	SCREW, M4 X 10 PH PAN HD
4H	1	14828800A	LABEL, ANALOG OUTPUT

Add For Setpoint Option (PTPN-XX1X-XXX)

5A	3	13636700A	AC RELAY, SOLID STATE
5B	1	14880500A	PCB ASSEMBLY, SETPOINT
5C	1	14915400A	HARNESS, SETPOINT

(*) May have revision letter prefix.

Add for Modbus Plus Interface Option (PTHN-X5XX-XXX)

4B	1	14467400A	STANDOFF, SNAP-IN 5/8"
4D	1	14829500A	MOUNTING BRACKET
4E	1	15165700A	PCB ASSEMBLY, MODBUS PLUS OPTION
4F	1	14915300A	HARNESS, OPTION
4G	4	R0511100A	SCREW, M4 X 10 PH PAN

Add for Allen Bradley Interface Option (PTHN-X6XX-XXX)

4A	1	14217400A	TERMINAL BLOCK, 3 POSITION
4B	1	14467400A	STANDOFF, SNAP-IN 5/8"
4D	1	14829500A	MOUNTING BRACKET
4E	1	15098500A	PCB ASSEMBLY, ALLEN BRADLEY RIO OPTION
4F	1	14915300A	HARNESS, OPTION
4G	4	R0511100A	SCREW, M4 X 10 PH PAN

Add for PROFIBUS Interface Option (PTHN-X9XX-XXX)

4B	1	14467400A	STANDOFF, SNAP-IN 5/8"
4D	1	14829500A	MOUNTING BRACKET
4E	1	15166100A	PCB ASSEMBLY, PROFIBUS OPTION
4F	1	14915300A	HARNESS, OPTION
4G	4	R0511100A	SCREW, M4 X 10 PH PAN

10 Appendices

Appendix 1: RS232 Serial I/O

The PANTHER will transmit RS232C serial data when a print command is issued using the PRINT pushbutton, Auto Print, or a remote print command from a host. The data format, baud rate, checksum, parity, etc. are selectable in the setup mode. The serial data is output in an 10-bit ASCII frame which includes: 1 start bit, 7 data bits, 1 parity bit, and 1 stop bit. Parity is selectable as none, odd, or even using SSW F3.1.4. Checksum and STX can be enabled or disabled using SSW F3.1.5 and F3.1.6. All demand mode printing is inhibited during motion and when the weight is under gross zero. Printing is allowed on power-up whether or not zero is captured if AZM is enabled (SSW F2.4.2). The available formats are:

SINGLE LINE DISPLAYED WEIGHT FORMAT

DATA	SO	STX	X	X	X	X	X	X	SP	LB	SP	NET	SI	CR	CHK	LF
NOTES	A	B	C	D	D	D	D	D	D	F	G	G	H	I	J	K

NOTES

A -SO = Shift-Out character (optional). If SSW F3.2.2 = 1, expanded print is enabled if receiving device is capable of using SO for enabling expanded (double-width) printing.

B -STX = Start of Text character (optional). If SSW F3.1.5 = 1, STX and checksum characters will be sent in this position.

C -X = weight data digit, minus sign (-) for negative weight or tare, or space character will be sent in this position.

D -X = Weight data digit or decimal point character.

E -SP = Space character.

F - "LB" sent for pounds when SSW F1.2 = 1, "kg" sent for kilograms when SSW F1.2 = 2, "g" sent for grams when SSW F1.2=3, "oz" sent for ounces when SSW F1.2=4, "XXXXXX LB XXXXXXoz" sent for lb-oz when SSW F1.2=5, "ozt" sent when SSW F1.2=6, "dwt" sent when SSW F1.2=7, "t" sent when SSW F1.2=8, "ton" sent when SSW F1.2=9, "%" sent when SSW F1.2=2 and SSW F5.7.2=1.

G -Space character and NET will be sent if displayed weight is a net weight. Space character and G will be sent if the displayed weight is gross.

H -SI = Shift-In character. If SSW F3.2.2 = 1, SI will reset receiving device to normal print mode (if receiving device is capable of using SO/SI to toggle between expanded and normal print modes.)

I -CR = carriage return character.

J -CHK = checksum character (optional). Checksum will be sent with STX if SSW F3.1.5 = 1.

K -LF = line feed character.

SINGLE LINE GROSS/TARE/NET FORMAT

DATA	STX	*	X	X	X	X	X	X	SP	LB	SP	G	SP	*	*	X	X	X	X	X	SP	LB	SP	T	SP	SO	*
NOTES	A	B	B	B	B	B	B	B	C	D	C	E	C	F	F	F	F	F	F	F	C	D	C	G	C	H	I

X	X	X	X	X	X	SP	LB	SP	NET	SI	CR	CHK	LF
I	I	I	I	I	I	C	D	C	J	K	L	M	N

NOTES

A -STX = Start of Text character (optional). If SSW F3.1.5 = 1, STX and checksum characters will be sent in data string

B -Gross weight data field (7 characters). (* = digit, minus sign (-), or space, X = digit or decimal point.)

C -SP = Space character

D - "LB" = pounds when SSW F1.2 = 1, "kg" sent for kilograms when SSW F1.2 = 2, "g" sent for grams when SSW F1.2=3, "oz" sent for ounces when SSW F1.2=4, "XXXXXX LB XXXXXXoz" sent for lb-oz when SSW F1.2=5, "ozt" sent when SSW F1.2=6, "dwt" sent when SSW F1.2=7, "t" sent when SSW F1.2=8, "ton" sent when SSW F1.2=9, "%" sent when SSW F1.2=2 and SSW F5.7.2=1.

E -G = Character for gross weight.

F -Tare weight data field (7 characters). (* = digit, space, X = digit or decimal point)

G -T = characters for tare weight

H -SO = Shift-Out character (optional). If SSW F3.2.2 = 1, expanded print is enabled (if receiving device is capable of using SO for enabling expanded (double-width) printing

I -Net weight data field (7 characters), (* = digit, minus sign (-), or space, X = digit or decimal point.)

J -NET = characters for net weight

K -SI = Shift-in character. If SSW F3.2.2 = 1, SI will reset receiving device to normal print mode (if receiving device is capable of using SO/SI to toggle between expanded and normal print modes.)

L -CR = carriage return character

M -CHK = checksum character (optional). Checksum will be sent with STX if SSW F3.1.5 =1

N -LF = line feed character

THREE LINE GROSS/TARE/NET FORMAT

LINE 1
GROSS WEIGHT

Line One Data	STX	X	X	X	X	X	X	X	SP	LB	SP	G	CR	CHK
NOTES	A	B	B	B	B	B	B	B	C	D	C	E	F	G

LINE 2
TARE WEIGHT

Line One Data	X	X	X	X	X	X	X	SP	LB	SP	T	CR	CHK	LF
NOTES	I	I	I	I	I	I	I	C	D	C	J	F	G	H

LINE 3
NET WEIGHT

Line One Data	SO	X	X	X	X	X	X	X	SP	LB	SP	NET	SI	CR	CHK	LF
NOTES	K	L	L	L	L	L	L	L	C	D	C	M	N	F	G	H

NOTES

A -STX = Start of Text character (optional). If SSW F3.1.5 = 1, STX and checksum characters will be sent in data string.

B -Gross weight data field (7 characters). (* = digit, minus sign (-), or space, X = digit or decimal point.)

C -SP = Space character

D - "LB" = pounds when SSW F1.2 = 1, "kg" sent for kilograms when SSW F1.2 = 2, "g" sent for grams when SSW F1.2=3, "oz" sent for ounces when SSW F1.2=4, "XXXXXX LB XXXXXXoz" sent for lb-oz when SSW F1.2=5, "ozt" sent when SSW F1.2=6, "dwt" sent when SSW F1.2=7, "t" sent when SSW F1.2=8, "ton" sent when SSW F1.2=9, "%" sent when SSW F1.2=2 and SSW F5.7.2=1.

E - G = Character for gross weight

F -CR = carriage return character

G -CHK = checksum character (optional). Checksum will be sent with STX if SSW F3.1.5 = 1

H -LF = line feed character

I -Tare weight data field (7 characters), (* = digit, space, X = digit or decimal point)

J -T = characters for tare weight

K -SO = Shift-out character (optional). If SSW F3.2.2 = 1, expanded print is enabled (if receiving device is capable of using SO for enabling expanded (double-width) printing).

L -Net weight data field (7 characters), (* = digit, minus sign (-), or space, X = digit or decimal point)

M -NET = characters for net weight

N -SI = Shift-in character. If SSW F3.2.2 = 1, SI will reset receiving device to normal print mode (if receiving device is capable of using SO/SI to toggle between expanded and normal print modes)

SERIAL DATA OUTPUT IN CONTINUOUS MODE

A 300-9600 baud continuous output may be selected instead of the print on demand output. This data consists of 16 or 18 bytes transmitted in a 10-bit ASCII frame consisting of: 1 start bit, 7 data bits, 1 even parity bit, and 1 stop bit. The format is:

Character	Function
1	STX (Start of text - Optional)
2	Status Word A
3	Status Word B

4	Status Word C
5	Weight MSD
6	Weight
7	Weight
8	Weight
9	Weight
10	Weight LSD
11	Tare Weight MSD
12	Tare Weight
13	Tare Weight
14	Tare Weight
15	Tare Weight
16	Tare Weight LSD
17	CR (carriage return)
18	CKSM (Checksum - Optional

Non-significant weight data and tare data digits will be transmitted as spaces. A description of the status words A, B, and C is shown in Tables 4-6.

TABLE 4A - CONTINUOUS MODE STATUS WORD A - SETPOINTS ENABLED (F5.1)

STATUS WORD A - SETPOINT OPTION ENABLED (F5.1)				
Bit 0, 1, 2	Encoded Decimal Point			
	Display	Bit 2	Bit 1	Bit 0
	XXXXX0	0	0	1
	XXXXXX	0	1	0
	XXXXX.X	0	1	1
	XXXX.XX	1	0	0
	XXX.XXX	1	0	1
Bit 3	Setpoint Output 1 (0 = less than setpoint value)			
Bit 4	Setpoint Output 2 (0 = less than setpoint value)			
Bit 5	Always = 1			
Bit 6	Always = 1			
Bit 7	Parity of Status Word A			

TABLE 4B - CONTINUOUS MODE STATUS WORD A - SETPOINTS DISABLED (F5.1)

STATUS WORD A - SETPOINTS OPTION DISABLED (F11)				
Bit 0, 1, 2 Encode Decimal Point				
	Display	Bit 2	Bit 1	Bit 0
	XXXXX0		0	01
	XXXXXX	0	1	0
	XXXXX.X	0	1	1
	XXXX.XX	1	0	0
	XXX.XXX	1	0	1
Bit 3, 4 Increment Size		3	4	
	X1	0	1	
	X2	1	0	
	X5	1	1	
Bit 5	Always = 1			
Bit 6	Always = 1			
Bit 7	Parity of Status Word A			

TABLE 5 - CONTINUOUS MODE STATUS WORD B

STATUS WORD B	
Bit 0	Gross = 0, Net = 1
Bit 1	Minus sign = 1
Bit 2	Overcapacity = 1
Bit 3	Motion = 1
Bit 4*	lb = 0, kg = 1
Bit 5	Always = 1
Bit 6	- If setpoints enabled (F11 = 1), bit 6 = within zero tolerance. - If setpoints disabled (F11 = 0), bit 6 = Power Up Flag.
Bit 7	Parity of Status Word B

Note: Bit 4 is set if units are other than lb or kg.

TABLE 6 - CONTINUOUS MODE STATUS WORD C

TABLE 6 - CONTINUOUS MODE STATUS WORD C	
Bit 0	Always = 0
Bit 1	Always = 0
Bit 2	Always = 0
Bit 3	Print = 1
Bit 4	Always = 1
Bit 5	Always = 1
Bit 6	Always = 1
Bit 7	Parity of Status Word C

Appendix 2: Standard Interface Command Set (SICS) Protocol

All new Mettler Toledo indicators support the standardized command set "METTLER TOLEDO Standard Interface Command Set" (MT-SICS), which is divided into 4 levels, depending on the functionality of the weighing instrument. The PANTHER Terminal supports the MT-SICS level 0 command set.

What Do the Commands of MT-SICS Level 0 Offer?

You can use the commands of MT-SICS level 0 to perform the following operations via the interface:

- Request weighing results,
- Tare the terminal,
- Zero the terminal,
- Identify MT-SICS implementation,
- Identify the terminal,
- Reset the terminal.

Additional Documentation on Data Interface

Settings of the interface such as baud rate, parity, and connector pin assignments are described in previous sections of this manual.

Version number of the MT-SICS

Each level of the MT-SICS has its own version no. which can be requested with the command I1.

This section describes: MT-SICS level 0, version 2.1x.

You can use the command I1 via the interface to request the MT-SICS level and MT-SICS version implemented on the PANTHER Terminal.

Command Formats

Each command received by the PANTHER Terminal via the data interface is acknowledged by a response of the PANTHER Terminal to the transmitter. Commands and responses are data strings with a fixed format.

Commands sent to the balance comprise one or more characters of the ASCII character set. Here, the following must be noted:

- Enter commands only in uppercase.
- The possible parameters of the command must be separated from one another and from the command name by a space (ASCII 32 dec. in this description represented as _).
- Each command must be closed by CR LF (ASCII 13 dec., 10 dec.)

The characters CR and LF, which can be inputted using the Enter or Return key of most entry keypads, are not listed in this description, but it is essential they be included for communications with the PANTHER Terminal.

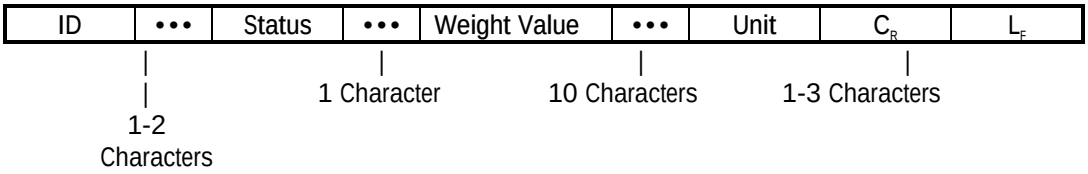
Response Formats

All responses sent by the PANTHER Terminal to the transmitter to acknowledge the received command have one of the following formats:

- Response with weight value
- Response without weight value
- Error message

Format of the Response with Weight Value

A general description of the response with weight value is the following:



- ID--Response identification.
- _-- Space (ASCII 32 dec.)
- Status--Status of the terminal, see description of the commands and responses.
- Weight Value--Weighing result: shown as number with 10 digits, including sign directly in front of the first digit. The weight value appears right-aligned. Preceding zeroes are not shown with the exception of the zero to the left of the decimal point.
- Unit--Weight unit displayed after the terminal has been switched on.
- CR--Carriage Return (ASCII 13 dec.)
- LF--Line Feed (ASCII 10 dec.)

Comment--CR LF will not be shown in the description.

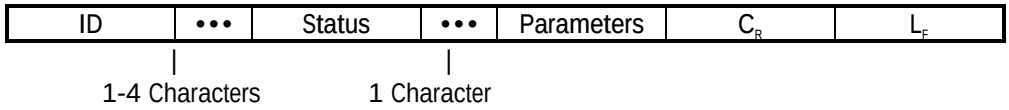
Example

Response with stable weight value of 0.256 g:

S_S_ _ _ _ _ _0.256_g

Format of the Response Without Weight Value

A general description of the response without weight value is the following:



- ID--Response identification.
- _--Space (ASCII 32 dec.)
- Status--Status of the terminal, see description of the commands and responses.
- Parameters--Command-dependent response code.
- Unit--Weight unit displayed after the terminal has been switched on.
- CR--Carriage Return (ASCII 13 dec.)
- LF--Line Feed (ASCII 10 dec.)

Error messages

ID	C_R	L_F

ID--Error Identification

The PANTHER Terminal supports the following two error ID:.

- ES--Syntax error
  The terminal does not recognize the command.

CR--Carriage return (ASCII 13 dec.)
LF--Line Feed (ASCII 10 dec.)

Tips for the Programmer. Command and Response---You can improve the dependability of your application software by having your program evaluate the response of the terminal to a command. The response is the acknowledgment that the terminal has received the command.

Reset. To start from a determined state when establishing the communication between terminal and system, you should send a reset command to the terminal. When the terminal or system is switched on or off, faulty characters can be received or sent.

Quotation Marks (""). Quotation marks included in the command must always be entered.

Commands and Responses MT-SICS Level 0

The PANTHER receives commands from the system computer and acknowledges the command with an appropriate response. The following sections contain a detailed description of all commands of the command set in alphabetical order with the associated responses. Commands and responses are closed with CR and LF. These termination characters are not shown in the following description, but they must always be entered with commands or sent with responses.

The commands of MT-SICS level 0 are supported by the PANTHER. They include:

- I1 Inquiry of MT-SICS level and MT-SICS version
- I2 Inquiry of terminal data
- I3 Inquiry of terminal SW version
- I4 Inquiry of serial number
- S Send stable weight value
- SI Send weight value immediately
- SIR Send weight value immediately and repeat
- T Tare
- Z Zero
- @ Reset

1. I1--INQUIRY OF MT-SICS LEVEL AND MT-SICS VERSIONS
Command: I1--Inquiry of MT-SICS level and MT-SICS versions
Response: I1_A_"x1"_"x2"_"x3"_"x4"_"x5"
   - x1 = 0--Terminal with MT-SICS level 0
   - x2--Version of the implemented MT-SICS0 commands
   - x3--Version of the implemented MT-SICS1 commands
   - x4--Version of the implemented MT-SICS2 commands
   - x5--Version of the implemented MT-SICS3 commands

Example
Command I1--Inquiry of MT-SICS level and versions used in the PANTHER Terminal.
Response--I 1_A_"0"_"2.10"_""_""_""
- 0 Level 0 implemented in PANTHER Terminal
- 2.10 Level 0, version 2.10 in PANTHER Terminal
- "" Level 1 not supported in PANTHER Terminal
- "" Level 2 not supported in PANTHER Terminal
- "" Level 3 not supported in PANTHER Terminal

Comments
- In the case of MT-SICS level, only fully implemented levels are listed. In other words, if it is not possible to implement all commands from a certain level, the level is not specified.
- In the case of the MT-SICS version, all levels are specified even those only partially implemented.

2. I2--INQUIRY OF TERMINAL DATA
Command: I2--Inquiry of terminal type.
Response: I2_A_"text" • Terminal data as "text".

Example
Command I2--Inquiry of PANTHER Terminal type.
Response--I2_A_"Panther_Analog_ _ _ _ _ _10000_lb"
- This response shows the PANTHER is used with analog load cells and has been calibrated for 10000 lb capacity.

3. I3--INQUIRY OF TERMINAL SOFTWARE VERSION
Command: I3--Inquiry of terminal SW version
Response: I3_A_"text" • Terminal SW version as "text".

Example
Command I3--Inquiry of terminal SW version.
Response--I3_A_"0.00_0.00_A148912R"
- 0.00--PANTHER Terminal has no operating system
- 0.00--Always this value for PANTHER Terminal
- A148912R--PANTHER Terminal software number

4. I4--INQUIRY OF SERIAL NUMBER
Command: I4--Inquiry of serial number.
Response: I4_A_"text"
- Serial number as "text"

Example
Command I4--Inquiry of serial number
Response--I4_A_"00000000
- 0000000000--Always this value for the PANTHER.

Comments
- The response to I4 appears after the reset command (@) and at power-up.

5. S--SEND STABLE WEIGHT VALUE
Command: S--Send the current stable weight

Responses:
- S_S_WeightValue_Unit--Current stable weight value.
- S_I--Command not executable (time-out since stability was not achieved.)
- S_+ --Terminal in overcapacity range.
- S_- --Terminal in undercapacity range.

Example
Command S--Send a stable weight value.
Response: S_S_ _ _ _ _100.00_g
- The current stable weight is 100.00 g.

Comments
- The duration of the stability time-out is 2 seconds for the PANTHER.
- The weight unit is the currently selected unit.

6. SI--SEND WEIGHT VALUE IMMEDIATELY
Command: SI--Send the current weight value regardless of scale stability.
Responses:
- S_S_WeightValue_Unit--Stable weight value.
- S_D_WeightValue_Unit--Dynamic weight value.
- S_+ --Terminal in overcapacity range.
- S_- --Terminal in undercapacity range.

Example
Command SI--Send current weight value.
Response: S_D_ _ _ _ _129.02_LB
- The current dynamic weight is 129.02 LB.

Comments
- The response to the command SI is the last internal weight value (stable or dynamic) prior to receipt of the command SI.
- The weight unit is the currently selected unit.

7. SIR--SEND WEIGHT VALUE IMMEDIATELY AND REPEAT
Command: SIR--Send weight values repeatedly, regardless of terminal stability.
Responses:
- S_S_WeightValue_Unit--Stable weight value.
- S_D_WeightValue_Unit--Dynamic weight value.
- S_+ --Terminal in overcapacity range.
- S_- --Terminal in undercapacity range.

Example
Command: SIR--Send current weight values at intervals.
Responses:
- S_D_ _ _ _ _129.02_LB
- S_D_ _ _ _ _129.06_LB
- S_D_ _ _ _ _129.08_LB
- S_D_ _ _ _ _114.14_LB
- ..._Terminal sends stable or dynamic weight values at intervals.

Comments
- SIR is overwritten by the commands S, SI, SIR, @ and thus canceled.
- The PANTHER Terminal updates 20 times per second.
- The weight unit is the currently selected unit.

8. T--TARE

Command: T--Tare, i.e. store the next stable weight value as a new tare weight value.

Responses:

- T_S_WeightValue_Unit--Taring performed, i.e. stability criterion and taring range complied with. The tare weight value returned corresponds to the weight change on the terminal since the last zero setting.
- T_I--Taring not performed (time-out since stability was not reached.)
- T_+ --Upper limit of taring range exceeded.
- T_- --Lower limit of taring range exceeded.

Example

Command: T--The PANTHER Terminal is tared and has a value of 100.00 kg in the tare memory.
Response--T_S_ _ _ _ _100.00_kg

Comments

- The tare memory is overwritten by the new tare weight value.
- The duration of the stability time-out is 2 seconds for the PANTHER.
- The tare memory can be cleared using the command Z.
- The weight unit is the currently selected unit.

9. Z--ZERO

Command: Z--Zero the terminal.
Responses:

- Z_A--The following then holds:
  - Gross = net + tare = 0
  - Zero setting performed, i.e. stability criterion and zero setting range complied with.
- Z_I--Zero setting not performed (time-out since stability was not reached).
- Z_+ --Upper limit of zero setting range exceeded.
- Z_- --Lower limit of zero setting range exceeded.

Example

Command Z--Zero.
Response--Z_A--Zero setting performed.

Comments

- The tare memory is cleared during zero setting.
- The duration of the stability time-out is 2 seconds for the PANTHER.

10. @--RESET

Command: @--Reset the terminal to the conditions found after switching on.
Response:

- I4_A_"text"--Serial number of the terminal, the terminal is ready for operation.

Example

Command @--Reset
Response--I4_A_"0000000000"--PANTHER terminal reset and sends the null serial number.

Comments
- All commands awaiting responses are canceled.
- The tare memory is reset to zero.
- The “reset” command is always executed.

Appendix 3: Geo Codes

Use the following Geo Codes if you relocate your PANTHER to a location other than the original location where it was calibrated.

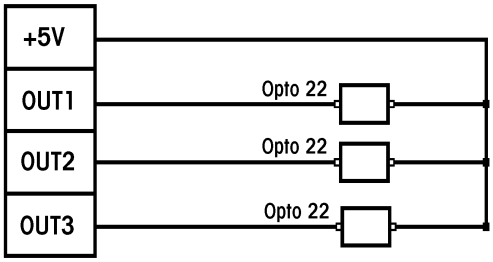
Northern and southern latitude in degrees and miles	Height above sea-level in meters										
	0 325	325 650	650 975	975 1300	1300 1625	1625 1950	1950 2275	2275 2600	2600 2925	2925 3250	3250 3575
	Height above sea-level in feet										
	0 1060	1060 2130	2130 3200	3200 4260	4260 5330	5330 6400	6400 7460	7460 8530	8530 9600	9600 10660	10660 11730
0° 0′ —5° 46′	5	4	4	3	3	2	2	1	1	0	0
5° 46′ — 9° 52′	5	5	4	4	3	3	2	2	1	1	0
9° 52′ — 12° 44′	6	5	5	4	4	3	3	2	2	1	1
12° 44′ — 15° 6′	6	6	5	5	4	4	3	3	2	2	1
15° 6′ — 17° 10′	7	6	6	5	5	4	4	3	3	2	2
17° 10′ — 19° 2′	7	7	6	6	5	5	4	4	3	3	2
19° 2′ — 20° 45′	8	7	7	6	6	5	5	4	4	3	3
20° 45′ — 22° 22′	8	8	7	7	6	6	5	5	4	4	3
22° 22′ — 23° 54′	9	8	8	7	7	6	6	5	5	4	4
23° 54′ — 25° 21′	9	9	8	8	7	7	6	6	5	5	4
25° 21′ — 26° 45′	10	9	9	8	8	7	7	6	6	5	5
26° 45′ — 28° 6′	10	10	9	9	8	8	7	7	6	6	5
28° 6′ — 29° 25′	11	10	10	9	9	8	8	7	7	6	6
29° 25′ — 30° 41′	11	11	10	10	9	9	8	8	7	7	6
30° 41′ — 31° 56′	12	11	11	10	10	9	9	8	8	7	7
31° 56′ — 33° 9′	12	12	11	11	10	10	9	9	8	8	7
33° 9′ — 34° 21′	13	12	12	11	11	10	10	9	9	8	8
34° 21′ — 35° 31′	13	13	12	12	11	11	10	10	9	9	8
35° 31′ — 36° 41′	14	13	13	12	12	11	11	10	10	9	9
36° 41′ — 37° 50′	14	14	13	13	12	12	11	11	10	10	9
37° 50′ — 38° 58′	15	14	14	13	13	12	12	11	11	10	10
38° 58′ — 40° 5′	15	15	14	14	13	13	12	12	11	11	10
40° 5′ — 41° 12′	16	15	15	14	14	13	13	12	12	11	11
41° 12′ — 42° 19′	16	16	15	15	14	14	13	13	12	12	11
42° 19′ — 43° 26′	17	16	16	15	15	14	14	13	13	12	12
43° 26′ — 44° 32′	17	17	16	16	15	15	14	14	13	13	12
44° 32′ — 45° 38′	18	17	17	16	16	15	15	14	14	13	13
45° 38′ — 46° 45′	18	18	17	17	16	16	15	15	14	14	13
46° 45′ — 47° 51′	19	18	18	17	17	16	16	15	15	14	14
47° 51′ — 48° 58′	19	19	18	18	17	17	16	16	15	15	14
48° 58′ — 50° 6′	20	19	19	18	18	17	17	16	16	15	15
50° 6′ — 51° 13′	20	20	19	19	18	18	17	17	16	16	15

Northern and southern latitude in degrees and miles	Height above sea-level in meters										
	0 325	325 650	650 975	975 1300	1300 1625	1625 1950	1950 2275	2275 2600	2600 2925	2925 3250	3250 3575
	Height above sea-level in feet										
	0 1060	1060 2130	2130 3200	3200 4260	4260 5330	5330 6400	6400 7460	7460 8530	8530 9600	9600 10660	10660 11730
51° 13′ — 52° 22′	21	20	20	19	19	18	18	17	17	16	16
52° 22′ — 53° 31′	21	21	20	20	19	19	18	18	17	17	16
53° 31′ — 54° 41′	22	21	21	20	20	19	19	18	18	17	17
54° 41′ — 55° 52′	22	22	21	21	20	20	19	19	18	18	17
55° 52′ — 57° 4′	23	22	22	21	21	20	20	19	19	18	18
57° 4′ — 58° 17′	23	23	22	22	21	21	20	20	19	19	18
58° 17′ — 59° 32′	24	23	23	22	22	21	21	20	20	19	19
59° 32′ — 60° 49′	24	24	23	23	22	22	21	21	20	20	19
60° 49′ — 62° 9′	25	24	24	23	23	22	22	21	21	20	20
62° 9′ — 63° 30′	25	25	24	24	23	23	22	22	21	21	20
63° 30′ — 64° 55′	26	25	25	24	24	23	23	22	22	21	21
64° 55′ — 66° 24′	26	26	25	25	24	24	23	23	22	22	21
66° 24′ — 67° 57′	27	26	26	25	25	24	24	23	23	22	22
67° 57′ — 69° 35′	27	27	26	26	25	25	24	24	23	23	22
69° 35′ — 71° 21′	28	27	27	26	26	25	25	24	24	23	23
71° 21′ — 73° 16′	28	28	27	27	26	26	25	25	24	24	23
73° 16′ — 75° 24′	29	28	28	27	27	26	26	25	25	24	24
75° 24′ — 77° 52′	29	29	28	28	27	27	26	26	25	25	24
77° 52′ — 80° 56′	30	29	29	28	28	27	27	26	26	25	25
80° 56′ — 85° 45′	30	30	29	29	28	28	27	27	26	26	25
85° 45′ — 90° 00′	31	30	30	29	29	28	28	27	27	26	26

Appendix 4: Discrete Outputs

The outputs are +5 VDC. A solid state relay or OPTO 22 is typically connected to buffer the outputs to a 120 or 220 volt AC signal. An output terminal supplies a 5 volt DC supply for reference to the setpoint outputs. Because the supply is rated at 115 mA of DC current, make sure the total current draw from the devices used (relays or optos) do not exceed this limit. If the calculated current draw exceeds 115 mA, an external power supply is required. External power supplies are available from your authorized Mettler Toledo representative.

The setpoint outputs are negative true and “ON” when the scale weight is below the setpoint coincidence value. The setpoints operate on the absolute value of the scale weight so they can be used for both weigh-in and weigh-out processes. The following diagram shows a typical wiring scheme.



NOTES

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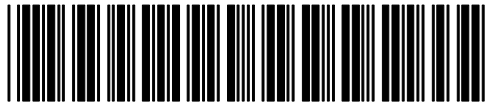

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