S7 Setpoint Controller

CONTENTS

1   Introduction

This manual provides detailed information for setup, operating, and servicing the S7 Setpoint Controller. The S7 Setpoint Controller uses a Siemens S7-222 micro PLC programmed by Mettler Toledo. Mettler Toledo provides a 24 VDC power supply with the Setpoint Controller as the PLC input power source, an additional 12 VDC power supply is provided with the Fiber Optic Converter option. This manual supports version 2 software.

Review all instructions and safety precautions carefully. Installation and service procedures should be preformed only by authorized personnel.

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
1900 Polaris Parkway
Columbus, Ohio 43240
(614) 438-4511

Warnings/Precautions

WARNING!

This equipment generates, uses, and can radiate radio frequency energy and if not installed and used properly, i.e., in accordance with the instructions manual, may cause harmful interference to radio communications. Operation of this equipment in a residential or commercial environment is likely to cause interference which case the user at own expense will be required to take whatever measures may be required to correct the interference.

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.
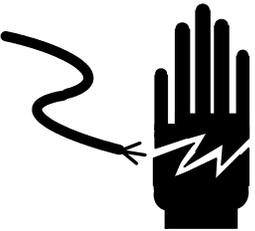
⚠ **WARNING**

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.
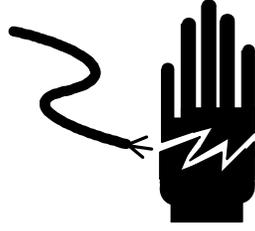
⚠ **WARNING**

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

DO NOT REMOVE THE GROUND CONNECTION.
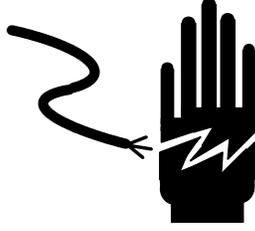
⚠ **WARNING**

DISCONNECT ALL POWER TO THIS UNIT BEFORE REMOVING THE FUSE OR SERVICING.

⚠ **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.

⚠️ **WARNING**

ONLY THE TYPE 7/9 VERSION OF THE S7 SETPOINT
CONTROLLER IS USABLE IN A HAZARDOUS AREA
CLASSIFIED AS CLASS I OR II, DIVISION 1 OR 2,
GROUPS C, D, E, F, AND G. THE NATIONAL ELECTRIC
CODE MUST BE FOLLOWED WITHOUT EXCEPTION,
FAILURE TO DO SO COULD RESULT IN BODILY HARM
AND/OR PROPERTY DAMAGE.

Model Identification

Use the information below to confirm the correct model number for the S7 Setpoint Controller with which you will be working. The model number is found on the data plate on the S7 Setpoint Controller.

```
S7SPC   X   X   X   X   X   00
         |   |   |   |   |
PACKAGING                              |   |   |   |   |
1 = DIN RAIL, FOR PANEL MOUNT          |   |   |   |
2 = Type 4x HOUSING                    |   |   |   |
3 = TYPE 7/9 HOUSING                   |   |   |   |
                                       |   |   |   |
OPERATION JUMPERS                      |   |   |   |
0 = TWH, SIMULTANEOUS FEED             |   |   |
1 = TWH, ALTERNATE FEED                |   |   |
2 = TDH, SIMULTANEOUS FEED             |   |   |
3 = TDH, ALTERNATE FEED                |   |   |
4 = COINCIDENCE MODE                   |   |   |
                                       |   |   |
FRONT PANEL SWITCHES                   |   |   |
0 = NONE                               |   |
1 = START, STOP                        |   |
2 = START, JOG, STOP                   |   |
3 = START, STOP, DISCHARGE             |   |
4 = START, STOP, RESET                 |   |
5 = START, STOP, DISCHARGE, RESET      |   |
>6 = OTHER/CUSTOM ORDER                |   |
                                       |   |
FRONT PANEL PILOT LIGHTS               |   |
0 = NONE                               |
1 = ALARM                              |
2 = CYCLE COMPLETE                     |
3 = BATCH READY                        |
4 = ALARM, CYCLE COMPLETE              |
5 = ALARM, BATCH READY                 |
6 = CYCLE COMPLETE, BATCH READY        |
7 = ALARM, CYCLE COMPLETE, BATCH READY |
>7 = OTHER/ CUSTOM ORDER               |
                                       |
FIBER OPTIC CONVERTER                  |
0 = NONE
1= WITH FIBER OPTIC CONVERTER
```

TWH = TARE-WEIGH IN-HOLD, OPIONAL DISCHARGE.
TDH = TARE-DISCHARGE-HOLD, OPTIONAL REFILL.

SWITCHES AND PILOT LIGHTS ARE NOT AVAILABLE FOR DIN RAIL PACKAGE.

FIBER OPTIC CONVERTER PROVIDED AS PANEL MOUNT WITH DIN RAIL PACKAGE INTERNALLY MOUNTED IN TYPE 4x AND TYPE 7/9 PACKAGES.

Installation

The S7 Setpoint Controller temperature rating is 0 to 40 °C, ambient.
The S7 Setpoint Controller wiring terminals are rated for wire sizes #22 to #14 AWG.

Din Rail Mount

The Din Rail package of the S7 Setpoint Controller is to be mounted on a user supplied panel within a Type 1 or better enclosure. The fasteners required are two #8-32 machine screws, or two M4 screws. The S7 Setpoint Controller may be mounted horizontally or vertically. Avoid mounting the S7 Setpoint controller near heat generating equipment, high voltage or electrical noise generating equipment.
A space of one inch both top and bottom should be provided for ventilation.
The Siemens PC to PPI cable is five meters long and contains optocoupler isolation. The PC to PPI cable should be enclosed within the user's enclosure and avoid high noise wiring such as connections to solenoids.
See wiring diagram supplied with order for wire connections.
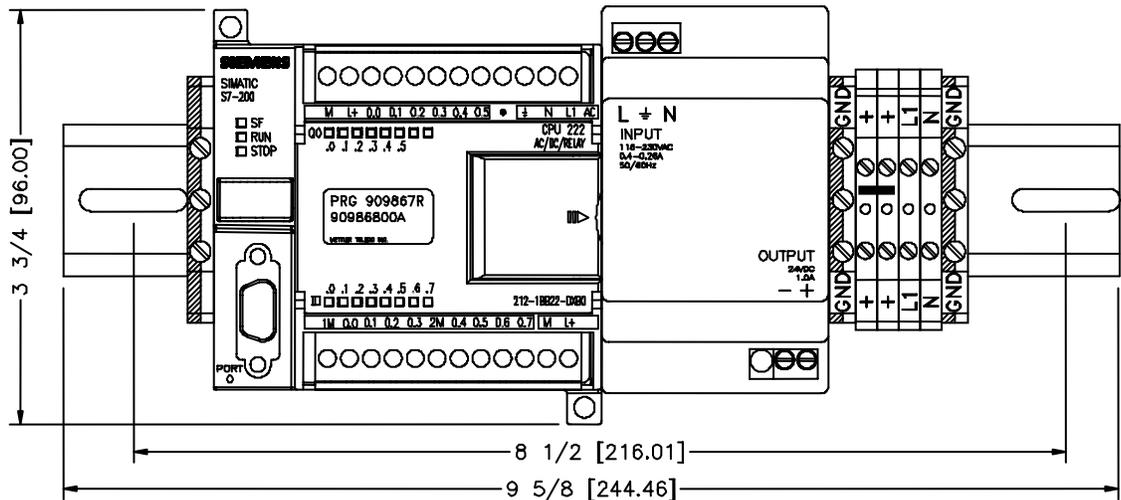
Type 4X

The Type 4X package of the S7 Setpoint Controller is intended to be mounted on a wall, stand or pole, supplied by user. The fasteners required are four ¼ inch bolts, or four M6 bolts. Avoid mounting the S7 Setpoint controller near heat generating equipment, high voltage or electrical noise generating equipment.
A space of two inches on all sides should be provided for heat dissipation.
User or installer must supply all conduit and fittings for installation wiring.
See wiring diagram supplied with order for wire connections.

START

DISCHARGE

RESET   STOP

11.04 [280.40]
10.28 [261.14]
8.00 [203.20]
13.50 [342.90]
12.75 [323.85]
12.22 [310.46]
12.00 [304.80]
⌀0.31 [7.92]

6.34 [160.99]
2.38 [60.58]
3.50 [88.90]   3.50 [88.90]

3/4 N.P.T.
CONDUIT
OPENING

1" N.P.T.
CONDUIT
OPENING

3/4 N.P.T.
CONDUIT
OPENING

10.00 [254.00]
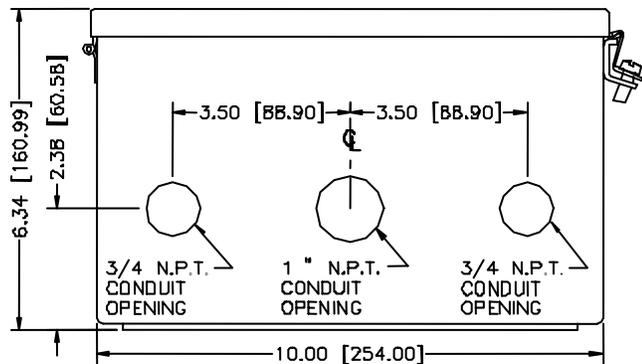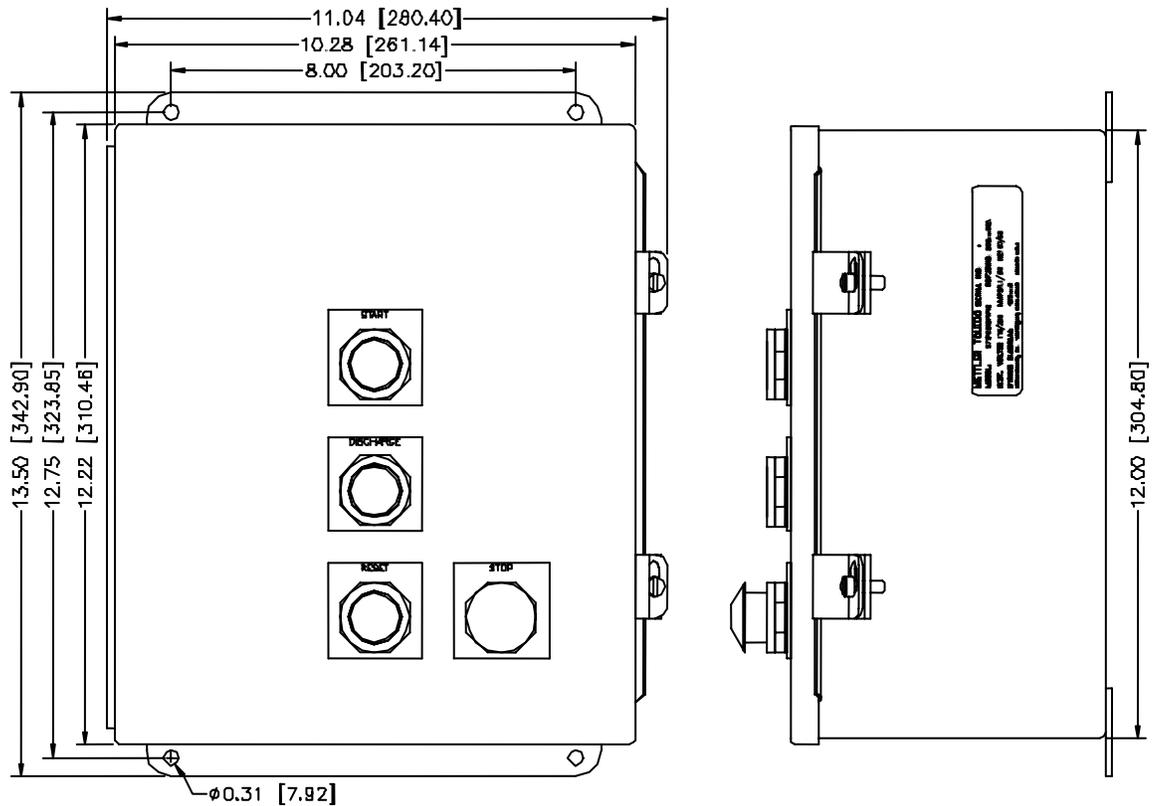
BOTTOM VIEW

Type 7/9

The Type 7/9 package of the S7 Setpoint Controller is intended to be mounted on a wall, stand or pole, supplied by user. The fasteners required are four 5/16 inch bolts, or four M8 bolts. Avoid mounting the S7 Setpoint controller near heat generating equipment, high voltage or electrical noise generating equipment.
A space of two inches on all sides should be provided for heat dissipation.
User or installer must supply all conduit seals, rigid conduit and fittings for installation wiring. The complete installation must conform to national and local electrical codes for Hazardous Area environments plus any user installation requirements.
See wiring diagram supplied with order for wire connections.
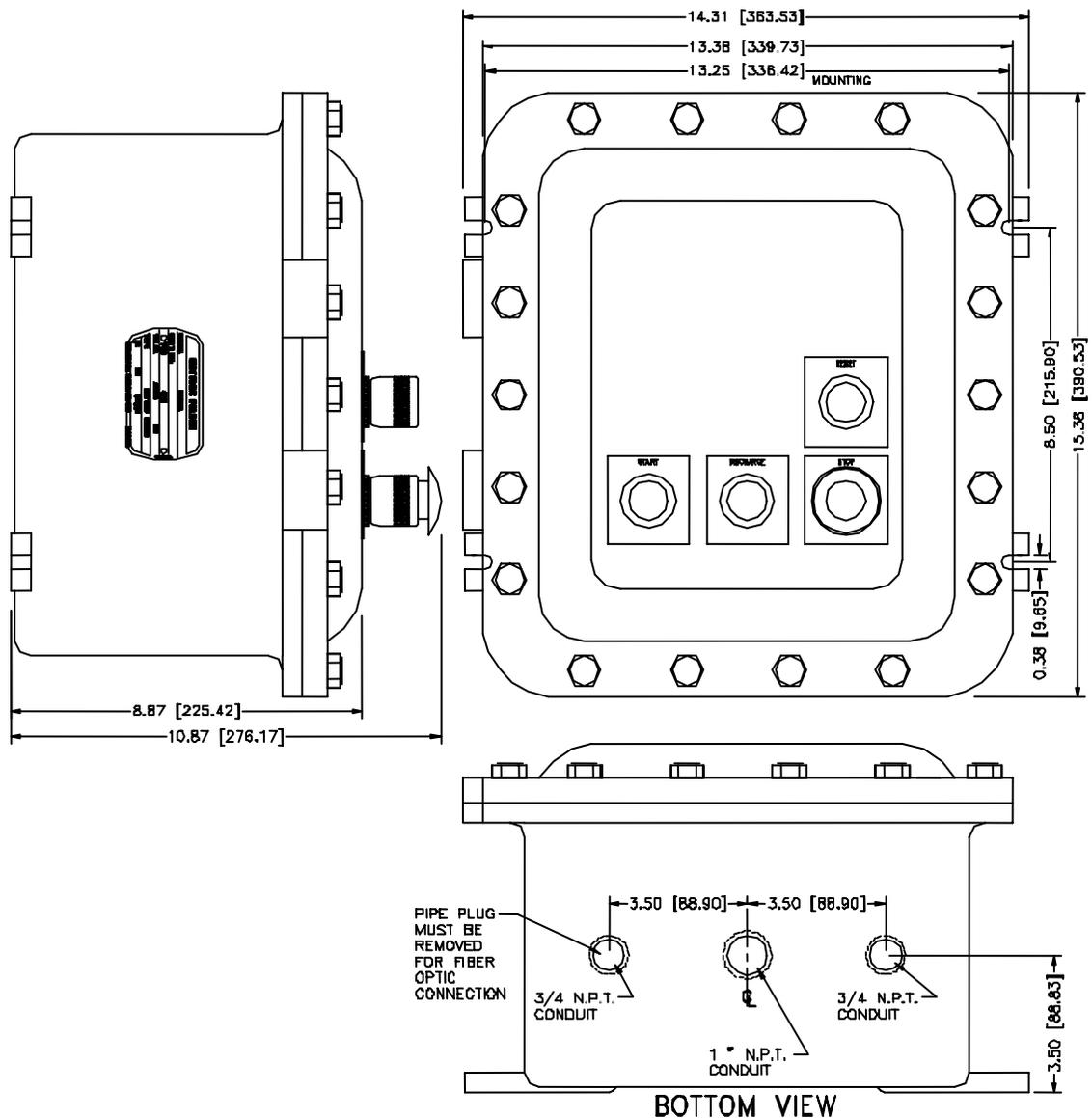
Data Connections

The S7 Setpoint Controller is provided with a RS232 to RS485 interface cable made by Siemens; this cable is called the PC to PPI Converter Cable. The RS232 end of the PC to PPI cable is a DB-9 female connector. When a Fiber optic Converter is provided by Mettler Toledo as part of the S7 Setpoint Controller order an interface connector, DB-9P to DB-25P, is provided for connecting the PC to PPI cable to the Fiber Optic Converter. Connections direct to the PC to PPI cable require a DB-9P connector, and a three conductor shielded cable, the shield must be terminated to ground at the scale terminal end only. The following chart shows connections required.

Scale Terminal Communication port, RS232	Scale Terminal Function	PC to PPI cable pin number	PC to PPI cable function
TxD	Transmit	2	Receive
RxD	Receive	3	Transmit
Gnd	Ground	5	Ground

Power Requirements

The S7 Setpoint Controller works over a range of power supply voltages from 100 to 230 V.A.C., 1 phase, 50 / 60 Hz, noise free, with ground. Power supply connections are to terminals on the din rail with the Siemens S7-222 PLC. Terminal 'L1' is the connection terminal for the line side of the power supply. Terminal 'N' is the connection terminal for the neutral side of the power supply. Terminal 'GND' is the connection terminal for earth grounding.

The S7 Setpoint Controller requires external fusing, for power supply voltage; this fusing must be supplied by user at installation.

The S7 Setpoint Controller does not provide a power supply disconnect, the user must provide the power supply disconnect.

CURRENT DRAW		
VERSION	110 VAC	230 VAC
Din Rail Mount	0.6 Amp.	0.32 Amp.
TYPE 4x and TYPE 7/9 without Fiber Optic Converter	0.6 Amp.	0.32 Amp.
TYPE 4x and TYPE 7/9 with Fiber Optic Converter	1.06 Amp.	0.82 Amp.

2   Configuration / Setup

PLC Configuration Jumpers

The S7 Setpoint Controller can be configured to do several weigh process sequences or provide coincidence outputs for the Scale Terminal Setpoints. All jumpers to the PLC inputs must be connected to the `+' (24 VDC) terminal provided with the S7 Setpoint Controller.

PLC Input	Mode	Function(s)
none	Process Mode, weigh in	Tare-Weight-Hold, simultaneous 2 speed feed. Optional Discharge, 1 speed, after weigh in.
0.4	Process Mode, weigh out	Tare-Discharge-Hold, simultaneous 2 speed discharge. Optional Refill, 1 speed.
0.5	Coincidence Mode	Setpoint output.
0.6	Alternate Feed for Process Modes	Changes feed outputs to Alternate 2 speed feed for weigh in and weigh out functions.
0.7	Print for Process Modes.	Adds print to end of weigh in or weigh out process.

Note: The Coincidence Mode, PLC input 0.5 over rides all other Configuration Jumpers.

PLC Switch Input Assignments

The PLC switch inputs may be operators, relays or P.L.C. transistor outputs. Voltage is 24 V.D.C. only. Current draw per PLC input is four mA. Except for the Stop function all PLC switch inputs are normally open. The Stop function is normally closed.

PLC Input	Mode	Function
0.0	Process, weigh in	Start
0.0	Process, weigh out	Refill
0.0	Coincidence	Print
0.1	Process, weigh in	Discharge
0.1	Process, weigh out	(Start) Discharge
0.1	Coincidence	Tare
0.2	Process, weigh in	Stop
0.2	Process, weigh out	Stop
0.2	Coincidence	Clear
0.3	Process, weigh in	Reset
0.3	Process, weigh out	Reset
0.3	Coincidence	Zero

Note:
All other switches/operators are outside the Siemens S7-222 PLC programming, they are manual functions only. These switches would include, and are not limited to, Jog, Auto/Manual, and Material selectors.

⚠ **WARNING**

PERMIT ONLY QUALIFIED PERSONNEL WHO ARE TRAINED IN THE OPERATION OF THE WEIGHING SYSTEM TO OPERATE THIS EQUIPMENT. WHEN OPERATING EQUIPMENT IN THE MANUAL/JOG MODE, THE SETPOINT FEATURES ARE NOT FUNCTIONAL AND FILLING WILL CONTINUE UNTIL THE MANUAL/JOG BUTTON IS RELEASED

FAILURE TO OBSERVE THESE PRECAUTIONS COULD RESULT IN BODILY INJURY.

PLC Output Assignments

The S7 Setpoint Controller PLC outputs are relay type, dry contact.

The PLC outputs are in two blocks of three contacts each.

Each PLC output block shares a common power terminal connection.

Each PLC output block can handle a maximum of 6 Amps, maximum of 2 Amps. for each PLC relay output contact, into a resistive load.

Lamp load rating is 30 watts for DC and 200 watts for AC.

Inductive loads must be suppressed.

The voltage rating for each PLC output block is 5 – 30 VDC, 24 – 230 VAC.

The S7 Setpoint Controller provides no short circuit protection or output power disconnect, user must provide external circuit protection and power disconnect at their expense.

When the S7 Setpoint Controller is used in a manual or automatic process the user must provide a hard wired Emergency Stop circuit outside the S7 Setpoint Controller circuits.

PLC Output	Mode	Function
0.0	Process, weigh in	Feed or Feed Slow
0.0	Process, weigh out	Discharge or Discharge slow
0.0	Coincidence	Setpoint 1
0.1	Process, weigh in	Fast Feed
0.1	Process, weigh out	Fast Discharge
0.1	Coincidence	Setpoint 2
0.2	Process, weigh in	Discharge
0.2	Process, weigh out	Refill
0.2	Coincidence	Setpoint 3
0.3	Process, weigh in	Cycle Complete
0.3	Process, weigh out	Cycle Complete
0.3	Coincidence	Setpoint 4
0.4	Process, weigh in	Alarm
0.4	Process, weigh out	Alarm
0.4	Coincidence	Tolerance 1 (Setpoint 5)
0.5	Process, weigh in	Batch Ready
0.5	Process, weigh out	Batch Ready
0.5	Coincidence	Tolerance 2 (Setpoint 6)

Scale Terminal Setup

The S7 Setpoint controller will work with a variety of Mettler Toledo Scale Terminals; the terminals include the PUMA, ID3sTx, PANTHER, and LYNX. This manual only covers the requirements of the scale terminal communications to the S7 Setpoint Controller. Communications is bidirectional.

Push-button and Manual Tare to be enabled. Tare Interlock to be disabled. AutoClear Tare to be disabled.

ASCII Remote Input must be enabled.

The use of the JagXtreme Terminal is not part of the S7 Setpoint Controller standard program.

PUMA and ID3sTx Terminal

The PUMA or ID3sTx Terminal must include at least one Fiber Optic Interface with two fiber optic cables; if printing is required a second Fiber Optic interface must be used. The S7 Setpoint Controller must include the Fiber Optic Converter option.

Communications from the PUMA or ID3sTx Terminal must be continuous output at 9600 Baud, 7 Data Bits, Even Parity, 1 Stop Bit, and no Checksum character. ASCII Remote Input must be enabled.

It is suggested that Alternate Units be disabled.

Setpoints must be enabled and setup for 4 Setpoint Mode. Setpoint 1 Tolerance set for Zero tolerance. Absolute Value must be set for 1.

Setup Step	Setting
21	2
22	0
24	0
31	1
32	1
33	9600
34	2
35	0
36	0
71	0
81	1
82	0
84	1

PANTHER Terminal

Communications from the PANTHER Terminal must be 9600 Baud, Even Parity, no Checksum sent, STX enabled, and Continuous Mode.
Weigh Mode must be set to Setpoint.

It is suggested that Alternate Units be set to None.

LYNX Terminal

Communications from the LYNX Terminal must be 9600 Baud, & Data Bits, 1 Stop Bit, Even Parity, no Flow, no Checksum character, Continuous Mode, Standard Continuous Format, Status Bytes with Setpoints, and Command Input.

Quantity of 2-Speed outputs must be set to zero.
Set Output #1 to Setpoint, displayed Weight.
Set Output #2 to Setpoint, displayed Weight.
Set Output #5 to Setpoint, displayed Weight. (Setpoint 5 is equal to Tolerance 1).

It is suggested that 2nd Units be Disabled.

Setpoint Usage

Weigh In Mode:

<u>Setpoint 1</u> is used as the final cutoff Setpoint (Target), set at the net weight value required for the fill.

<u>Setpoint 2</u> is used as the dribble (slow) feed switch point, a value less than Setpoint 1, set at the desired weight to start dribble (slow) feed. If a 10 (ten) pound dribble fill is desired and Setpoint 1 is set at 100 (one hundred) then Setpoint 2 should be set at 90 (ninety).

<u>Tolerance 1 (Setpoint 5)</u> is used as Discharge setpoint.

A setting of one scale grad would mean that the scale must be empty (zero weight) at the end of the Discharge sequence.

Weigh Out Mode:

<u>Setpoint 1</u> is used as the final cutoff Setpoint (Target), set at the net weight value required for the discharge.

<u>Setpoint 2</u> is used as the dribble (slow) discharge switch point, a value less than Setpoint 1, set at the desired weight to start dribble (slow) discharge. If a 10 (ten) pound dribble discharge is desired and Setpoint 1 is set at 100 (one hundred) then Setpoint 2 should be set at 90 (ninety).

<u>Tolerance 1 (Setpoint 5)</u> is used as Refill (Feed) setpoint. Refill is always in Gross weight mode.

3   Process Mode Sequences

Power Up Sequence

Upon power up the S7 Setpoint Controller will turn off all outputs and resets the internal sequence to a before initiation state.

If the scale terminal is communicating with the S7 Setpoint Controller a Clear Command will be sent by the controller to the scale terminal.

Either the Cycle Complete or the Batch Ready output will be on, the output that is on is dependent on the process that is configured.

If there is no communications from the scale terminal to the controller the Alarm output will be on, all other outputs will be off.

Reset Sequence

When the Reset input is applied the S7 Setpoint Controller will turn off all outputs and resets the internal sequence to a before initiation state. A Clear command will be sent to the scale terminal.

Either the Cycle Complete or the Batch Ready output will be on, the output that is on is dependent on the process that is configured.

Alarm Conditions

The Alarm output will only be turned on under three conditions:
1. The loss of communications or improper setup of communication from the scale terminal.
2. The scale terminal has gone into an over capacity condition.
3. The scale terminal has gone into a under zero condition.

Tare-Weigh-Hold, 2 Speed Simultaneous Feed

The S7 Setpoint Controller requires no Configuration Jumpers for this Process mode.

The S7 Setpoint Controller uses the following scale terminal Setpoints:
Setpoint 1 is used as the final cutoff Setpoint, set at the weight value required for the fill.
Setpoint 2, is used as the dribble (slow) feed switch point, a value less than Setpoint 1, set at the desired weight to start dribble (slow) feed.
Tolerance 1 (Setpoint 5), this Setpoint is also used as the Discharge setpoint. When the scale weight is below the value entered the sequence cycle is considered complete.

The sequence will start at a zero scale indication, in the Gross weight mode, no Tare command will be sent to the scale terminal when this scale condition exists.

After the Power Up Sequence or the Reset Sequence the Cycle Complete output will be on. If using the Discharge function and there is material in the scale, applying the Discharge input and holding it on will turn the Discharge output on until the Discharge input is removed. This functioning of the Discharge input will continue until the Start input is applied.
If the scale terminal was in the net weight mode when the Reset Sequence was initiated the scale terminal Tare will be Cleared.

Removing the Stop input while a sequence is running will turn off the Feed or Discharge outputs. Appling the Start input will resume the weigh sequence. Appling the Discharge input will resume the discharge sequence.

The Discharge sequence is only enabled after a weigh sequence has completed and the Batch Ready output is on.

If there is no communications from the scale terminal to the controller the Alarm output will be on, all other outputs will be off.

Weigh In Sequence:

1. The Start input is applied.

2. The Cycle Complete output is turned off.

3. A check is made of the scale terminal indicated weight and mode.
   - If the scale terminal is not at zero weight and not in the Net mode a Tare command is sent to the scale terminal.
   - If the scale terminal is in the Net mode and the weight is above zero a Tare command is sent to the scale terminal.
   - If the scale terminal is in the Net mode and the weight is at zero the sequence advances to step 4.
   - If the scale terminal in not in the Net mode and the weight is at zero the sequence advances to step 4.

4. When the scale terminal indicated weight is at zero, Net or Gross, the Feed and Fast Feed outputs are turned on. The scale weight increases as material is fed onto the scale.

5. When the scale terminal indicated weight reaches Setpoint 2 the Fast Feed output is turned off, the Feed output remains on.

6. When the scale terminal indicated weight reaches Setpoint 1 the Feed output is turned off.

7. The scale terminal remains in the Net mode. Optional Printing will now be processed.

8. After a short delay the Batch Ready output is turned on.

The weigh sequence is now complete. The material on the scale may be manual removed as in container filling when the scale terminal indicated weight falls below the Tolerance 1 setpoint a Clear command is sent to the scale terminal, the Batch Ready output is turned off and the Cycle Complete output is turned on.

The Discharge Sequence may be used to empty the scale as in hopper filling.

Discharge Sequence:

1. The Discharge input is applied; a Clear command is sent to the scale terminal and the Batch Ready output is turned off.

2. The Discharge output is turned on.

3. The scale terminal indicated weight decreases toward the Tolerance 1 setpoint.

4. When the scale terminal indicated weight is below the Tolerance 1 setpoint value the sequence advances to step 5.

5. After a short delay, to allow material to clear the discharge hardware, the Discharge output is turned off and the Cycle Complete output is turned on.

The Discharge Sequence is now complete.

Tare-Weigh-Hold, 2 Speed Alternate Feed

The S7 Setpoint Controller requires a Configuration Jumper from the Controller terminal '+' to the PLC input 0.6 for this Process mode.

The S7 Setpoint Controller uses the following scale terminal Setpoints:
Setpoint 1 is used as the final cutoff Setpoint, set at the weight value required for the fill.
Setpoint 2, is used as the dribble (slow) feed switch point, a value less than Setpoint 1, set at the desired weight to start dribble (slow) feed.
Tolerance 1 (Setpoint 5), this Setpoint is also used as the Discharge setpoint. When the scale weight is below the value entered the sequence cycle is considered complete.

The sequence will start at a zero scale indication, in the Gross weight mode, no Tare command will be sent to the scale terminal when this scale condition exists.

After the Power Up Sequence or the Reset Sequence the Cycle Complete output will be on. If using the Discharge function and there is material in the scale, applying the Discharge input and holding it on will turn the Discharge output on until the Discharge input is removed. This functioning of the Discharge input will continue until the Start input is applied.
If the scale terminal was in the net weight mode when the Reset Sequence was initiated the scale terminal will remain in the net weight mode.

Removing the Stop input while a sequence is running will turn off the Feed or Discharge outputs. Appling the Start input will resume the weigh sequence. Appling the Discharge input will resume the discharge sequence.

The Discharge sequence is only enabled after a weigh sequence has completed and the Batch Ready output is on.

If there is no communications from the scale terminal to the controller the Alarm output will be on, all other outputs will be off.

Weigh In Sequence:

1. The Start input is applied.

2. The Cycle Complete output is turned off.

3. A check is made of the scale terminal indicated weight and mode.
   - If the scale terminal is not at zero weight and not in the Net mode a Tare command is sent to the scale terminal.
   - If the scale terminal is in the Net mode and the weight is above zero a Tare command is sent to the scale terminal.
   - If the scale terminal is in the Net mode and the weight is at zero the sequence advances to step 4.
   - If the scale terminal in not in the Net mode and the weight is at zero the sequence advances to step 4.

4. When the scale terminal indicated weight is at zero, net or gross, the Fast Feed output is turned on. The scale weight increases as material is fed onto the scale.

5. When the scale terminal indicated weight reaches Setpoint 2 the Fast Feed output is turned off, the Feed output is turned on.

6. When the scale terminal indicated weight reaches Setpoint 1 the Feed output is turned off.

7. The scale terminal remains in the Net weight mode. Optional Printing will now be processed.

8. After a short delay the Batch Ready output is turned on.

The weigh sequence is now complete. The material on the scale may be manual removed as in container filling when the scale terminal indicated weight falls below the Tolerance 1 setpoint a Clear command is sent to the scale terminal, the Batch Ready output is turned off and the Cycle Complete output is turned on.

The Discharge Sequence may be used to empty the scale as in hopper filling.

Discharge Sequence:

1. The Discharge input is applied; a Clear command is sent to the scale terminal and the Batch Ready output is turned off.

2. The Discharge output is turned on.

3. The scale terminal indicated weight decreases toward the Tolerance 1 setpoint.

4. When the scale terminal indicated weight is below the Tolerance 1 setpoint value the sequence advances to step 5.

5. After a short delay, to allow material to clear the discharge hardware, the Discharge output is turned off and the Cycle Complete output is turned on.

The Discharge Sequence is now complete.

Tare-Discharge-Hold, 2 Speed Simultaneous Feed

The S7 Setpoint Controller requires a Configuration Jumper from the Controller terminal '+' to the PLC input 0.4 for this Process mode.

The S7 Setpoint Controller uses the following scale terminal Setpoints:
Setpoint 1 is used as the final cutoff Setpoint, set at the weight value required for the discharge.
Setpoint 2, is used as the dribble (slow) feed switch point, a value less than Setpoint 1, set at the desired weight to start dribble (slow) discharge.
Tolerance 1 (Setpoint 5), is used as the Refill setpoint, set at a value less than holding capacity of the scale.

After the Power Up Sequence or the Reset Sequence the scale terminal will be in the gross weight indication mode.

While a sequence is not running a constant check is made of the scale terminal weight mode if the scale terminal is in the net weight mode a Clear command is sent to the scale terminal.

While a sequence is not running a constant check is made of the scale weight. If the scale weight is at or above the Setpoint 1 value the Batch Ready output will be on. If the scale weight is under the value of Setpoint 1 the Cycle Complete output will be on.

The Feed and Fast Feed outputs, PLC outputs 0.0 and 0.1, are used for the Discharge Sequence. The Discharge output, PLC output 0.2, is used for the Refill Sequence.

The Discharge input, PLC input 0.1, is used to start the Discharge Sequence. The Start input, PLC input 0.0, is used to start the Refill Sequence.

Removing the Stop input while a sequence is running will turn off the Feed or Discharge outputs. Appling the Start input will resume the Refill Sequence. Appling the Discharge input will resume the Discharge Sequence.

The Refill sequence is enabled when the Discharge sequence is not running and the gross scale weight is less than the value of the Tolerance 1 Setpoint.

If there is no communications from the scale terminal to the controller the Alarm output will be on, all other outputs will be off.

Only when the Batch Ready output is on can the Discharge Sequence be initiated.

Discharge Sequence:

1. The Discharge input is applied.
2. The Batch Ready output is turned off.
3. A Tare command is sent to the scale terminal.
4. When the scale terminal indicated weight is at net zero the Feed and Fast Feed outputs are turned on. The scale weight decreases as material is discharged out of the scale.
5. When the scale terminal indicated weight reaches Setpoint 2 the Fast Feed output is turned off, the Feed output remains on.

7. When the scale terminal indicated weight reaches Setpoint 1 the Feed output is turned off.

8. A Clear command is sent to the scale terminal putting the scale terminal in the Gross weight mode.

9. If the gross indicated weigh is less than Setpoint 1 the Cycle Complete output is turned on. If the gross indicated weigh is greater than Setpoint 1 the Batch Ready output is turned on.

The Discharge Sequence is now complete.

The Refill sequence is enabled when the Discharge sequence is not running and the gross scale weight is less than the value of the Tolerance 1 Setpoint.

Refill Sequence:

1. The Start input is applied and the Batch Ready or Cycle Complete output is turned off.

2. The Discharge output is turned on.

3. The scale terminal indicated weight increases toward the Tolerance 1 setpoint.

4. When the scale terminal indicated weight reaches the Tolerance 1 setpoint the Discharge output is turned off.

5. The Batch Ready output is turned on.

The Refill Sequence is now complete.

Tare-Discharge-Hold, 2 Speed Alternate Feed

The S7 Setpoint Controller requires two Configuration Jumpers from the Controller terminal '+' to the PLC input 0.4 and input 0.6 for this Process mode.

The S7 Setpoint Controller uses the following scale terminal Setpoints:
Setpoint 1 is used as the final cutoff Setpoint, set at the weight value required for the discharge.
Setpoint 2, is used as the dribble (slow) feed switch point, a value less than Setpoint 1, set at the desired weight to start dribble (slow) discharge.
Tolerance 1 (Setpoint 5), is used as the Refill setpoint, set at a value less than holding capacity of the scale.

After the Power Up Sequence or the Reset Sequence the scale terminal will be in the gross weight indication mode.

While a sequence is not running a constant check is made of the scale terminal weight mode if the scale terminal is in the net weight mode a Clear command is sent to the scale terminal.

While a sequence is not running a constant check is made of the scale weight. If the scale weight is at or above the Setpoint 1 value the Batch Ready output will be on. If the scale weight is under the value of Setpoint 1 the Cycle Complete output will be on.

The Feed and Fast Feed outputs, PLC outputs 0.0 and 0.1, are used for the Discharge Sequence. The Discharge output, PLC output 0.2, is used for the Refill Sequence.

The Discharge input, PLC input 0.1, is used to start the Discharge Sequence. The Start input, PLC input 0.0, is used to start the Refill Sequence.

Removing the Stop input while a sequence is running will turn off the Feed or Discharge outputs. Appling the Start input will resume the Refill Sequence. Appling the Discharge input will resume the Discharge Sequence.

The Refill sequence is enabled when the Discharge sequence is not running and the gross scale weight is less than the value of the Tolerance 1 Setpoint.

If there is no communications from the scale terminal to the controller the Alarm output will be on, all other outputs will be off.

Only when the Batch Ready output is on can the Discharge Sequence be initiated.

Discharge Sequence:

1. The Discharge input is applied.

2. The Batch Ready output is turned off.

3. A Tare command is sent to the scale terminal.

4. When the scale terminal indicated weight is at net zero the Fast Feed output is turned on. The scale weight decreases as material is discharged out of the scale.

5. When the scale terminal indicated weight reaches Setpoint 2 the Fast Feed output is turned off, the Feed output is turned on.

7. When the scale terminal indicated weight reaches Setpoint 1 the Feed output is turned off.

8. A Clear command is sent to the scale terminal putting the scale terminal in the Gross weight mode.

9. If the gross indicated weigh is less than Setpoint 1 the Cycle Complete output is turned on. If the gross indicated weigh is greater than Setpoint 1 the Batch Ready output is turned on.

The Discharge Sequence is now complete.

The Refill sequence is enabled when the Discharge sequence is not running and the gross scale weight is less than the value of the Tolerance 1 Setpoint.

<u>Refill Sequence:</u>

1. The Start input is applied and the Batch Ready or Cycle Complete output is turned off.

2. The Discharge output is turned on.

3. The scale terminal indicated weight increases toward the Tolerance 1 setpoint.

4. When the scale terminal indicated weight reaches the Tolerance 1 setpoint the Discharge output is turned off.

5. The Batch Ready output is turned on.

The Refill Sequence is now complete.

4

Coincidence Mode

When the S7 Setpoint Controller is in the Coincidence Mode the PLC outputs emulate the status of the scale terminal setpoints.
When the scale terminal indicated weight is below a setpoint value the associated PLC output will be on. When the scale terminal indicated weight is equal or greater than a setpoint value the associated PLC output will be off.

The PUMA and ID3sTx scale terminals have six setpoints and will use all of the PLC outputs.
The PANTHER scale terminal has three setpoints and will only use the PLC outputs for Setpoint 1, Setpoint 2 and Tolerance 1.
The LYNX scale terminal has five setpoints and will use all PLC outputs except for Tolerance 2 (setpoint 6).

Power Up Sequence

Upon power up the S7 Setpoint Controller will turn off all outputs

If there is no communications from the scale terminal to the controller all the PLC outputs will be off. When communications is not established the S7 Setpoint Controller remains in the Power Up Sequence. Communications with the scale terminal must be restored to continue.

After the end of the Power Up Sequence the PLC outputs will emulate the status of the scale terminal setpoints.

5

Electrical Parts List

See assembly prints provided with order for a complete parts list.

Din Rail Mount

Description	Part Number
S7-222, PLC with program	90998600A
Power Supply, 24 VDC @ 1 Amp.	90950800A
Siemens PC/PPI Converter Cable	90970300A

Type 4x, no Fiber Optic Converter

Description	Part Number
S7-222, PLC with program	90998600A
Power Supply, 24 VDC @ 1 Amp.	90950800A
Siemens PC/PPI Converter Cable	90970300A

Type 4x, with Fiber Optic Converter

Description	Part Number
S7-222, PLC with program	90998600A
Power Supply, 24 VDC @ 1 Amp.	90950800A
Siemens PC/PPI Converter Cable	90970300A
PCB, Fiber Optic Converter	A90030600A
Jumper Box, DB9P to DB25P	90983400A
Power Supply, 12 VDC @ 1.5 Amp.	90987600A
Harness, F/O Converter to Power Supply	90987800A

Type 7/9, no Fiber Optic Converter

Description	Part Number
S7-222, PLC with program	90998600A
Power Supply, 24 VDC @ 1 Amp.	90950800A
Siemens PC/PPI Converter Cable	90970300A

Type 7/9, with Fiber Optic Converter

Description	Part Number
S7-222, PLC with program	90998600A
Power Supply, 24 VDC @ 1 Amp.	90950800A
Siemens PC/PPI Converter Cable	90970300A
PCB, Fiber Optic Converter	A90030600A
Jumper Box, DB9P to DB25P	90983400A
Power Supply, 12 VDC @ 1.5 Amp.	90987600A
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