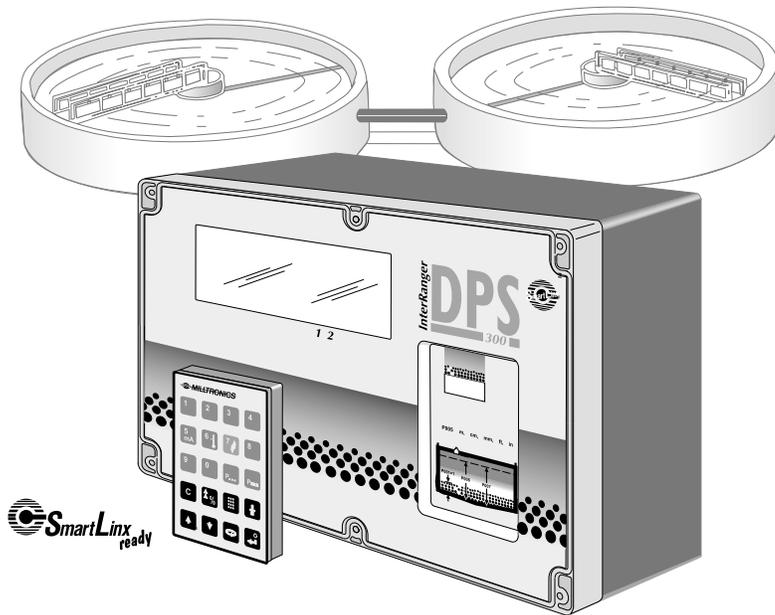


MILLTRONICS

INTERRANGER DPS 300

Instruction Manual PL-566

April 2001



INTERRANGER DPS 300

Safety Guidelines

Warning notices must be observed to ensure personal safety as well as that of others, and to protect the product and the connected equipment. These warning notices are accompanied by a clarification of the level of caution to be observed.

Qualified Personnel

This device/system may only be set up and operated in conjunction with this manual. Qualified personnel are only authorized to install and operate this equipment in accordance with established safety practices and standards.

Warning: This product can only function properly and safely if it is correctly transported, stored, installed, set up, operated, and maintained.

Note: Always use product in accordance with specifications.

Copyright Siemens Milltronics Process Instruments Inc. 2000. All Rights Reserved	Disclaimer of Liability
This document is available in bound version and in electronic version. We encourage users to purchase authorized bound manuals, or to view electronic versions as designed and authored by Siemens Milltronics Process Instruments Inc. Siemens Milltronics Process Instruments Inc. will not be responsible for the contents of partial or whole reproductions of either bound or electronic versions.	While we have verified the contents of this manual for agreement with the instrumentation described, variations remain possible. Thus we cannot guarantee full agreement. The contents of this manual are regularly reviewed and corrections are included in subsequent editions. We welcome all suggestions for improvement. Technical data subject to change.

MILLTRONICS® is a registered trademark of Siemens Milltronics Process Instruments Inc.

Contact SMPI Technical Publications at the following address:

Technical Publications
Siemens Milltronics Process Instruments Inc.
1954 Technology Drive, P.O. Box 4225
Peterborough, Ontario, Canada, K9J 7B1
Email: techpubs@milltronics.com

For the library of SMPI instruction manuals, visit our Web site: www.milltronics.com

TABLE OF CONTENTS

Specifications	5
Electronics.....	5
Programmer	6
Transducer.....	6
Options.....	7
Cable.....	8
Introduction.....	9
About This Manual	9
About The InterRanger DPS 300.....	10
Important InterRanger DPS 300 Features	12
Programmable Features	13
As a System	14
Application Planning.....	15
Circular Clarifiers	15
Rectangular Clarifiers	17
Application Example	21
Installation.....	23
Location.....	23
Optional Mounting Assembly	24
Optional Skimmer Guard	27
Transducer Mounting.....	32
Assembly.....	34
Communication	38
Level System Synchronization.....	39
Power	39
Programming	41
Display	41
Keypad – Program Mode.....	42
Programming Security	44
Quick Start Parameters.....	45
Operation.....	49
Display	49
Keypad – Run Mode	50
System Performance Evaluation.....	51
Performance Test Results	52

Application Parameters	53
Volume Parameters (P050 to P055)	53
Reading Parameters (P060 to P062)	55
Failsafe Parameters (P070 to P072)	56
Relay Parameters (P100 to P104, P110 to P113, P129)	58
mA Output Parameters (P200 to P203, P210 to P215, P219)	64
Enhancement Parameters	69
Data Logging Parameters (P300 and P302)	69
Profile Records (P330 to P337).....	70
Installation Records (P340 to P342).....	73
Range Calibration Parameters (P650 to P654).....	73
Temperature Compensation Parameters (P660 to P664).....	75
Rate Parameters (P700 to P707)	76
Measurement Verification Parameters (P710 to P713).....	78
Display Parameters (P730 to P733, P740)	79
Peripheral Communication Support Parameters (P740 to P749).....	80
SmartLinx [®] Parameters (P790 to P792).....	82
Echo Processing Parameters (P800 to P807).....	82
Advanced Echo Processing (P810 to P853)	84
Test Parameters (P900 to P913)	91
Measurement Parameters (P920 to P923)	93
Master Reset (P999)	95
Technical Reference	97
Transmit Pulse	97
Echo Processing	98
Distance Calculation.....	99
Sound Velocity	99
Scanning	99
Volume Calculation	100
Communication Support.....	101
Maintenance	105
Troubleshooting Guide	107
Default Parameter Settings	111
Programming Charts	113

Electronics

Power:	<ul style="list-style-type: none"> ◦ 100/115/200/230 V ac $\pm 15\%$, 50/60 Hz, 31 VA 	
Environmental:	<ul style="list-style-type: none"> ◦ location ◦ altitude ◦ ambient temperature ◦ relative humidity ◦ installation category ◦ pollution degree: 	<ul style="list-style-type: none"> ◦ indoor / outdoor ◦ 2000 m max ◦ -20 to 50°C (-5 to 122 °F) ◦ suitable for outdoor (Type 4X / NEMA 4X / IP65 enclosure) ◦ II ◦ 4
Scan Points:	<ul style="list-style-type: none"> ◦ 2 points per DPS 300 	
Accuracy:	<ul style="list-style-type: none"> ◦ 1% of program range* or 2 cm (0.8"), whichever is greater (ideal conditions) 	
Resolution:	<ul style="list-style-type: none"> ◦ 1% of program range* or 2 cm (0.8"), whichever is greater (ideal conditions) 	
Memory:	<ul style="list-style-type: none"> ◦ EEPROM (non-volatile) no back-up battery required 	
Programming:	<ul style="list-style-type: none"> ◦ via removable programmer and / or Dolphin Plus interface package 	
Display:	<ul style="list-style-type: none"> ◦ custom graphics, backlit LCD with 51 x 127 mm (5 x 2") viewing area 	
Temperature : Compensation	<ul style="list-style-type: none"> ◦ -50 to 150 °C (-58 to 302 °F) ◦ integral transducer sensor ◦ 2 TS-3 temperature sensors, max. ◦ programmable fixed temperature 	
Temperature Error:	<ul style="list-style-type: none"> ◦ with compensation: ◦ fixed temperature: 	<ul style="list-style-type: none"> ◦ 0.1% of range ◦ 0.22% / °C deviation from programmed temperature.
Outputs:	<ul style="list-style-type: none"> ◦ transducer drive: ◦ relays: ◦ mA output: 	<ul style="list-style-type: none"> ◦ 150 to 315 V peak ◦ 4 alarm/control relays ◦ 1 form "C" SPDT contact per relay, ◦ rated 5 A at 250 V ac, non-inductive ◦ 2 outputs max. ◦ 0.1% resolution ◦ 0-20 or 4-20 mA, scalable ◦ 750 Ω, isolated, 30 V rms

* *program range* is defined as the empty distance to the face of the transducer (P006) plus any range extension (P801).

- Communications:
(see Options)
- SmartLinx ® compatible
 - RS-232 / 485 port
 - Dolphin compatible
 - proprietary bipolar current loop for BIC-2 communication
- Enclosure:
- Type 4 / NEMA 4 / IP65
 - 285 mm W x 209 mm H x 92 mm D (11.2" W x 8.2" H x 3.6" D)
 - polycarbonate
- Weight:
- 2.7 kg (6 lb)
- Approvals:
- CE *, CSA NRTL/C
- *EMC performance available upon request.

Programmer

- Power:
- 9 V (ANSI/NEDA 1604, PP3 or equivalent)
- Ambient Temperature:
- -20 to 50°C (-5 to 122°F)
- Keypad:
- 20 keys with tactile feedback
- Interface:
- non-invasive, digital, infra-red
- Enclosure:
- general purpose
 - 67 mm W x 100 mm H x 25 mm D (2.6" W x 4" H x 1" D)
 - ABS plastic
- Weight:
- 150 g (0.3 lb)

Transducer

- Model:
- Echomax® XCT-12
- Beam angle:
(in water)
- 30°
- Range:
- 1 to 30m (3.3 to 99')

Refer to the associated instruction manual for wiring only (not installation).

Options

Skimmer Guard

- for protecting the transducer and allowing it to slide over the skimmer as it passes.

Mounting Assembly

- for securing and positioning the transducer in the clarifier.

Temperature Sensor:

- model TS-3

Buffered Interface Converter:

- BIC-II, DPS 300 bipolar communication current loop to remote RS232 or RS422 port

SmartLinx® Modules

- protocol specific modules for interface with popular industrial communication systems. Refer to associated product documentation.

Dolphin Plus:

- Milltronics Windows®-compatible interface and infrared ComVerter link
Refer to associated product documentation.

Cable:

- to suit transducer, temperature sensor, instrumentation and communication

Skimmer Guard

Model:	<ul style="list-style-type: none">◦ Type A for 20cm (8") skimmers◦ Type B for 40cm (16") skimmers
Temperature:	<ul style="list-style-type: none">◦ -40 to 80 °C (-40°C to 176°F)
Construction:	<ul style="list-style-type: none">◦ stainless steel hinged conduit with guard, and neoprene hinge boot
Connection:	<ul style="list-style-type: none">◦ transducer: 1" NPT or BSP coupling◦ conduit: ¾" NPT or BSP coupling
Articulation:	<ul style="list-style-type: none">◦ ± 90° off vertical
Weight:	<ul style="list-style-type: none">◦ Type A: 1.4 kg (3 lb)◦ Type B: 2.1 kg (5 lb)

Mounting Assembly

Application:	<ul style="list-style-type: none">◦ railings, typically 50mm dia. pipe or less, 2 rails spaced 432 to 610mm (17 to 24") apart on centre
Temperature:	<ul style="list-style-type: none">◦ -40 to 80°C (-40 to 176°F)
Construction:	<ul style="list-style-type: none">◦ epoxy coated aluminum, with stainless steel hardware
Weight:	<ul style="list-style-type: none">◦ 6.5 kg (15 lbs)

Cable

Transducer:	<ul style="list-style-type: none">o RG-62 A/U (or equivalent), 365m (1,200 ft) max. See transducer instructions for short extensions (in grounded metal conduit, separate from other wiring)
MA Output:	<ul style="list-style-type: none">o Belden 8760, shielded / twisted pair, 18 AWG (0.75mm²) or equivalent Maximum separation 1,500 m (5,000 ft)
Synchronisation:	<ul style="list-style-type: none">o Belden 8760, shielded / twisted pair, 18 AWG (0.75mm²) or equivalent
RJ-11 Port:	<ul style="list-style-type: none">o No shielded cable necessary Maximum length 3m
Bipolar Current Loop:	<ul style="list-style-type: none">o Belden 8760, shielded / twisted pair, 18 AWG (0.75mm²) or equivalent Maximum separation 1,500 m (5,000 ft)
RS-232 Link	<ul style="list-style-type: none">o Belden 8770, shielded / twisted pair, 18 AWG (0.75mm²) or equivalent Maximum separation 15 m (50 ft)
RS-485 Link:	<ul style="list-style-type: none">o Belden 8770, shielded / twisted pair, 18 AWG (0.75mm²) or equivalent Maximum separation 1,200 m (4,000 ft)

About This Manual

This instruction manual provides information specific to the **InterRanger DPS 300** (Dual Point Sludge) monitoring system.

<i>Introduction</i>	introduces installers and operators to the DPS 300, with brief descriptions of key features.
<i>Installation</i>	provides a step by step procedure to install the DPS 300.
<i>Programming</i>	defines program mode display and keypad functions, and general programming information.
<i>Quick Start Parameters</i>	details the minimum programming required to get started.
<i>Operation</i>	defines RUN mode display and keypad functions, including the RUN mode entry procedure and performance evaluation recommendations.
<i>Application Parameters</i>	details the programmable features which may be used to alter Run mode display, failsafe, relay, and mA output operation.
<i>Enhancement Parameters</i>	defines the programmable features used to enhance RUN mode operation. (Typically used as directed by the Troubleshooting Guide).
<i>Technical Reference</i>	provides detailed information for complex features and provides application examples.
<i>Troubleshooting Guide</i>	provides a quick reference to installation modification and programming remedies to overcome challenging operating conditions.
<i>Specifications</i>	lists the environmental, physical, and operational characteristics associated with the DPS 300.
<i>Programming Chart</i>	provides a convenient space to record all programming for future reference.

About The InterRanger DPS 300

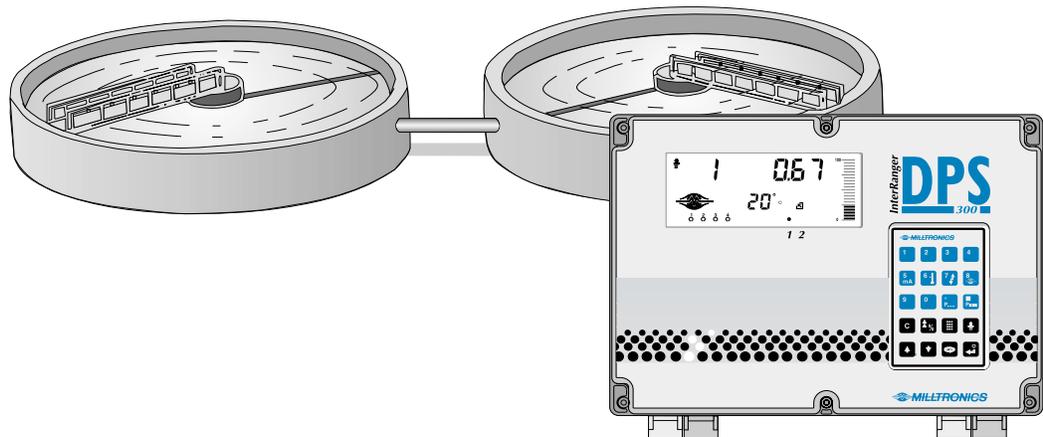
Note:

The InterRanger DPS 300 is to be used only in the manner outlined in this instruction manual.

This microprocessor based level monitor is designed specifically for the measurement of sludge blanket levels in wastewater clarifiers. A DPS 300 level monitor, and Milltronics ultrasonic transducer, accurately monitor the sludge blanket level without contacting the blanket.

The DPS 300 transmits electrical pulses to the transducer. The transducer converts the electrical pulses to ultrasonic pulses, which are emitted from the transducer face. The DPS 300 measures the time from pulse emission to reception of the echo from the sludge interface. The time measured, is used to calculate the distance from the transducer face to the sludge blanket.

The distance calculation is dependent upon the sound velocity through the wastewater in the clarifier, which is in turn dependent upon the temperature of the wastewater. The transducer, having an integral temperature sensor, and being immersed into the wastewater, also monitors the temperature of the wastewater. The transducer transmits the temperature to the DPS 300, where velocity compensation is applied to the level measurement calculation.



Nominally speaking, the DPS 300 is capable of detecting down to 4% solids, in up to 30m of turbid wastewater, and 0.2% solids in 5 m of clear wastewater.

This material and measurement range versatility is accomplished by using Milltronics patented Sonic Intelligence™. Sonic Intelligence provides high measurement reliability, regardless of changing conditions in the clarifier.

By using ultrasonic echo ranging principles with Sonic Intelligence and velocity compensation, the DPS 300 provides outstanding measurement accuracy, up to 1% of range, depending on process conditions.

The distance calculation may be converted to space, material level, material volume, or remaining capacity. The Reading chosen (and operating data) for each clarifier is displayed on the *Liquid Crystal Display* (LCD).

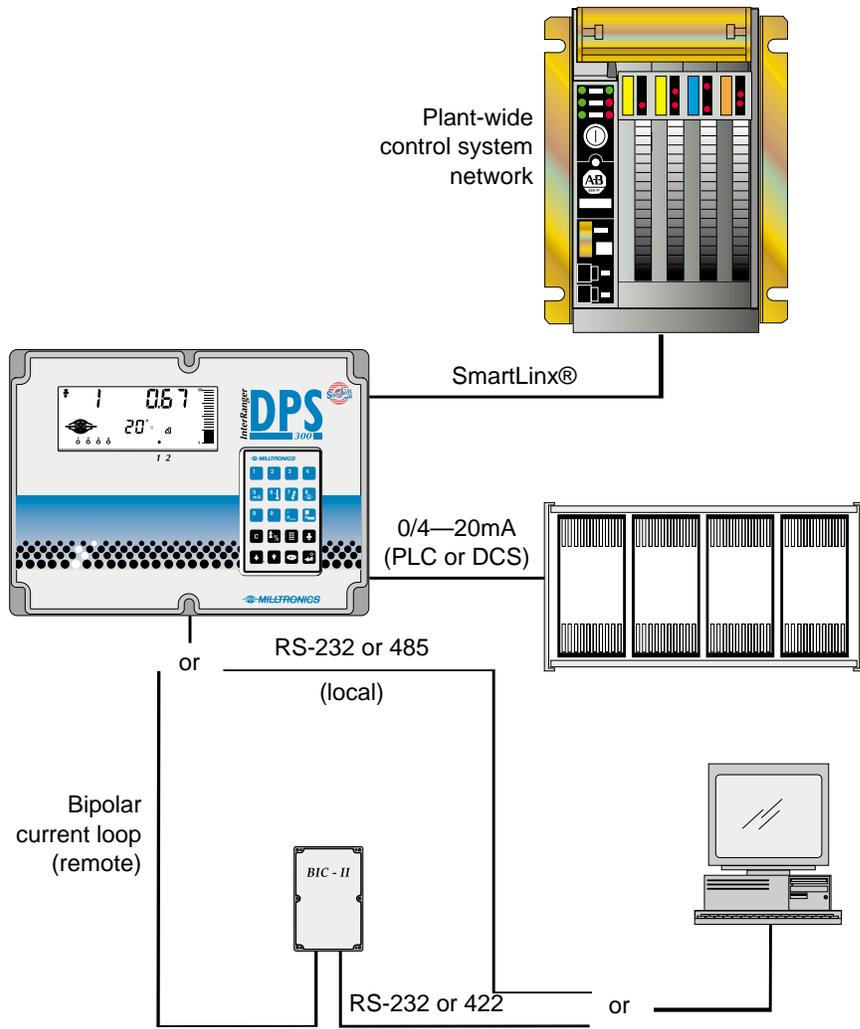
The relays and mA outputs may be used as preset (or programmed as desired) to activate alarms and/or operate remote monitoring equipment and/or process control equipment.

As well, the DPS 300 may be connected to a Milltronics *BIC-II* (Buffered Interface Converter) to provide RS-232 and/or RS-422 communications for host computers, Distributed Control Systems, and *special* (capable of operating as a host device) Programmable Logic Controllers.

Programming can be done locally using the portable programmer keypad, or remotely through optional Dolphin software or SmartLinx®.

- The programmer transmits the keypad entries via infrared link to the DPS 300, and can be removed when not in use.
- Dolphin allows programming either through the portable ComVerter and infrared link or hardwired via the RS-232/485 communication port.
- SmartLinx® provides protocol specific hardware and software for interface with popular industrial communication systems.

DPS 300 Communication Overview



Important InterRanger DPS 300 Features

Fixed Features

<i>Enclosure:</i>	Corrosion resistant, dust and liquid tight.
<i>Backlit LCD:</i>	Large digits for Reading and programming value displays. Illuminated LCD insures readability under all lighting conditions. Custom Graphic Symbols for continuous indication of operating conditions.
<i>Programmer:</i>	20 keys for easy access to programming and operating functions. Magnetic mounting and infrared interface permit removal on programming completion.
<i>Scanning:</i>	Capable of scanning two clarifiers, with the addition of a second transducer.
<i>Communications:</i>	SmartLinx® Compatible Communications ready when equipped with an appropriate Milltronics SmartLinx module. Milltronics Peripherals The communication port provides connection for RS-232, RS-485 or Milltronics bipolar current loop. The current loop provides remote communication via Milltronics BIC II to the peripheral device. The BIC II converts the current loop to RS-232 or RS-422 signal Dolphin Compatible Communications Dolphin Plus is Milltronics Windows95®-compatible software. It offers local interface through the infrared ComVerter, or remote connection through the RS-232 or RS-485 port. The software provides an easy means for programming, uploading, or downloading parameters.
<i>Reliability:</i>	Sonic Intelligence™ ensures all measurements are accurate and reliable. Immune to power interruptions. All programming is stored indefinitely. Dynamic operating data is retained for one hour and updated immediately on power resumption.

Programmable Features

Typically, a very small percentage of the programmable features require operator alteration. However, for demanding measurement requirements any operator programmable feature may be adjusted as desired.

Following is a list of some of the features that make the DPS 300 easy to program, yet versatile enough to handle complex level measurement requirements.

General Features

<i>Direct Access:</i>	Any operator programmable feature may be accessed directly.
<i>Scroll Access:</i>	Single button "scroll forward", single button "scroll back", to key features.
<i>Operation:</i>	Select "level", "space", or "distance".
<i>Material:</i>	Select "primary" or "secondary"; automatically adjusts echo processing for the type of clarifier.
<i>Units:</i>	Display Readings in m, cm, mm, ft, in, %, or any other units desired.

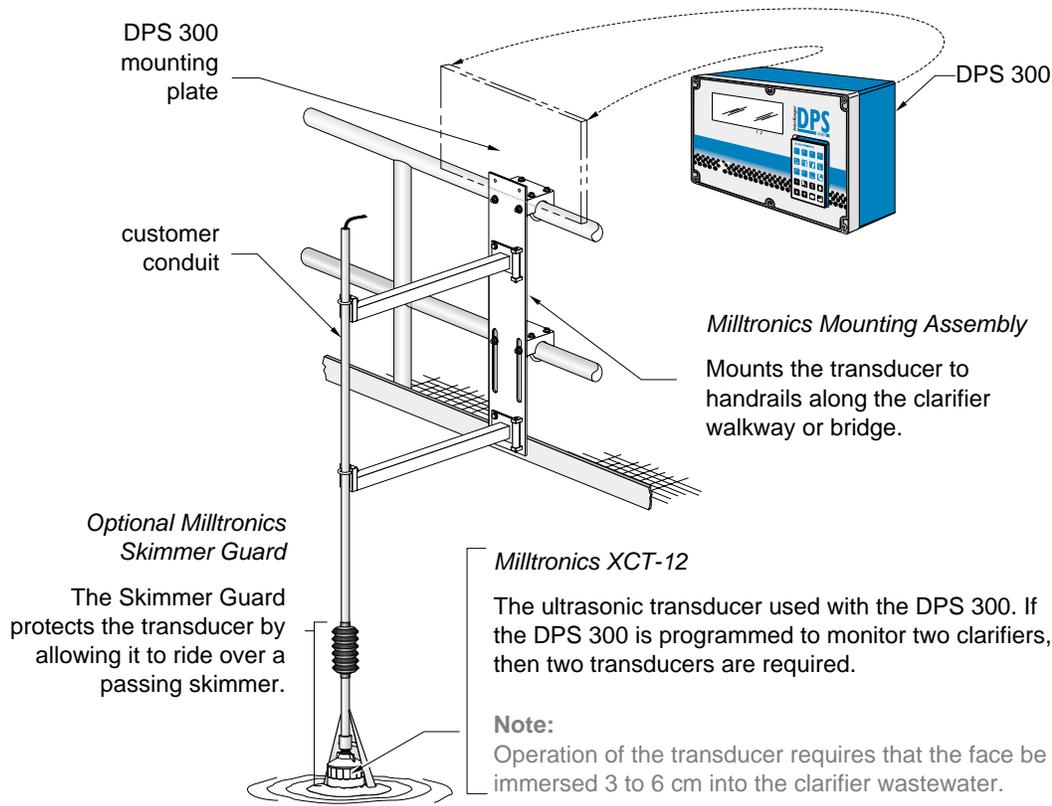
Additional Features (Use as Desired)

<i>Failsafe:</i>	Numerous failsafe options for process control equipment activation.
<i>Relays:</i>	8 functions including level, rate of change, pump control, temperature and more. Fixed or independent on/off setpoints
<i>mA outputs:</i>	Based on level, space, or distance. 4 range selections, 0-20, 4-20, 20-0, or 20-4 mA. Adjustable range and over-range limits.

As a System

As a system, the DPS 300 is made up of:

<i>minimum</i>	<i>maximum</i>
one DPS 300 one XCT-12 transducer	one DPS 300 two XCT-12 transducers one Skimmer Guard per transducer one Mounting Assembly per transducer one SmartLinX communications module



DPS 300 System Integration

- Assemble the transducer to the Milltronics Skimmer Guard if provided. Otherwise install directly to your conduit with a $\frac{3}{4}$ " to 1" NPT or BSP reducer.
Refer to the Skimmer Guard section for dimension and assembly details. Refer to the XCT-12 manual for connection and wiring details only.
- Assemble the Milltronics Mounting Assembly, if provided, to the handrail. And, mount the transducer (with Skimmer Guard if provided) to the Mounting Assembly. Otherwise mount the transducer assembly in a secure fashion.
Refer to the Mounting Assembly section for dimensions and assembly details.
- Install the DPS 300 and program the unit for your specific application.
Refer to the Application and Parameters sections of this manual.

The DPS 300 is designed to detect and measure the sludge blanket in up to two wastewater clarifiers. The basic requirements of a working DPS system are the transducers and the associated electronics.

The electronics can be mounted at the clarifier or up to 365 m away from the transducer. Refer to DPS 300 Specifications in this manual.

The transducer is installed such that its face is immersed 3 to 6 cm in the clarifier wastewater.

Beyond these given requirements, a few practical aspects of the clarifier application and its operation are of particular concern.

Circular Clarifiers

There are several different types of circular clarifiers, but all operate in the same basic way and share common design features that will need to be considered when installing an InterRanger™ DPS 300.

Some of these considerations are:

Catwalk, Bridge or Walkway

Most circular tanks have a catwalk that extends into the centre of the tank, usually with 2" (51 mm) or similar, tubular railings. These railings are the recommended mounting location for the InterRanger™.

The Milltronics Mounting Assembly is available to locate the transducer in this location.

Inlet

This is where the wastewater flows into the tank. **Do not** mount the transducer close to the inlet because the water is aerated and the sludge is disturbed. To obtain the most accurate readings, the sensor should be located above a relatively undisturbed portion of the tank where aeration is not present.

Tank sides

The sensor must be mounted at least 1 m (3') from the side of the tank. If the sensor is mounted closer than this the walls could cause interference and ultimately lead to inaccurate signals or errors.

Ladders, Beams, Supports, etc.

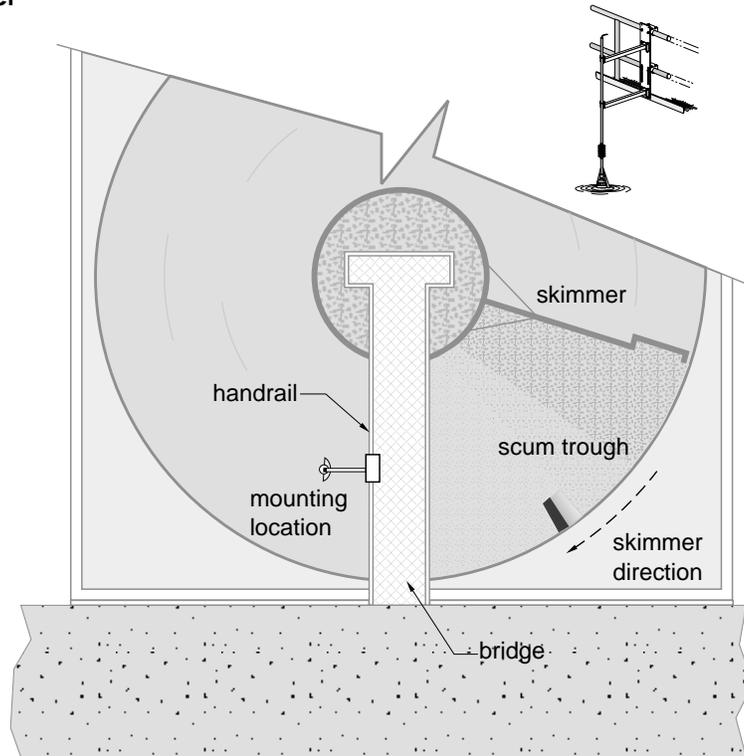
Be sure that there are no permanent underwater obstructions within 1 m (3') of the sensor that could disrupt the signal. Obtain drawings and/or consult with plant personnel to locate any of these structures that may not be visible.

Surface Skimmers

Skimmers are used to remove the scum from the surface of the water in the clarifier. The scum is skimmed away from the effluent weirs into a trough where it can be removed easily.

It is important to observe the skimmer action when setting up the InterRanger. If the best location for the sensor is in the path of the skimmer (often the case) then the optional Skimmer Guard must be used.

Circular Clarifier

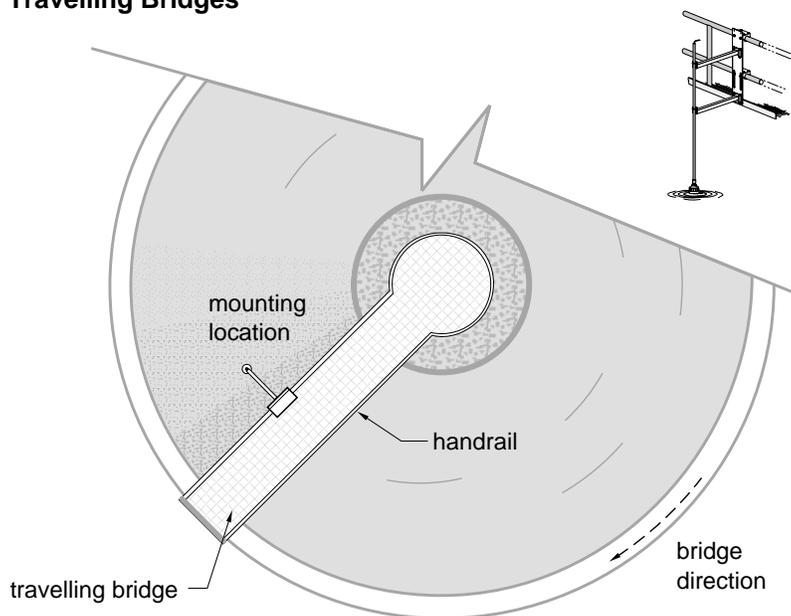


Scrapers

Scrapers keep the oldest sludge on the bottom of the tank from hardening and help to move the sludge into a hopper for pumping.

In circular tanks, the skimmer and scraper are often connected to the same rotating mechanism radiating from the centre of the tank. Common configurations could include one or two skimmers and up to four scrapers. Usually these arms are 90° or 180° apart.

Moving or Travelling Bridges



On some clarifiers the bridge or walkway moves with the skimmer. For clarifiers with these types of arrangements, care must be taken when choosing a mounting location. The following items should be considered when choosing a location on the bridge:

- The transducer should be mounted in front of the bottom scraper mechanism. The sludge becomes very disturbed after the passing of a bottom scraper and a clean interface will be difficult to detect. Mount the transducer in front of the scraper, ideally 180° from the scraper or 90° if two scrapers exist.
- Ensure that the transducer will not come into contact with the scum trough. It is important to observe the bridge motion through at least one complete cycle to ensure that the transducer and/or the mounting assembly will not collide with any structures in the tank.

Rectangular Clarifiers

There are several different types of rectangular clarifiers, but all operate in the same basic way and share common design features that will need to be considered when installing an InterRanger™ DPS 300.

Some of the considerations are:

Catwalk, Bridge or Walkway

Some rectangular tanks have a bridge that spans across the entire width of the tank, usually with 2" (51 mm) or similar, tubular railings. These railings are the recommended mounting location for the InterRanger™ once a suitable spot has been found.

The Milltronics Mounting Assembly is available to secure the transducer in this location.

Inlet

This is where the wastewater flows into the tank. **Do not** mount the transducer close to the inlet because the water is aerated and the sludge is disturbed. To obtain the most accurate readings, the sensor should be located above a relatively undisturbed portion of the tank where aeration is not present.

Tank sides

The sensor must be mounted at least 1 m (3') from the side of the tank. If the sensor is mounted closer than this, the walls could cause interference and ultimately lead to inaccurate signals or errors.

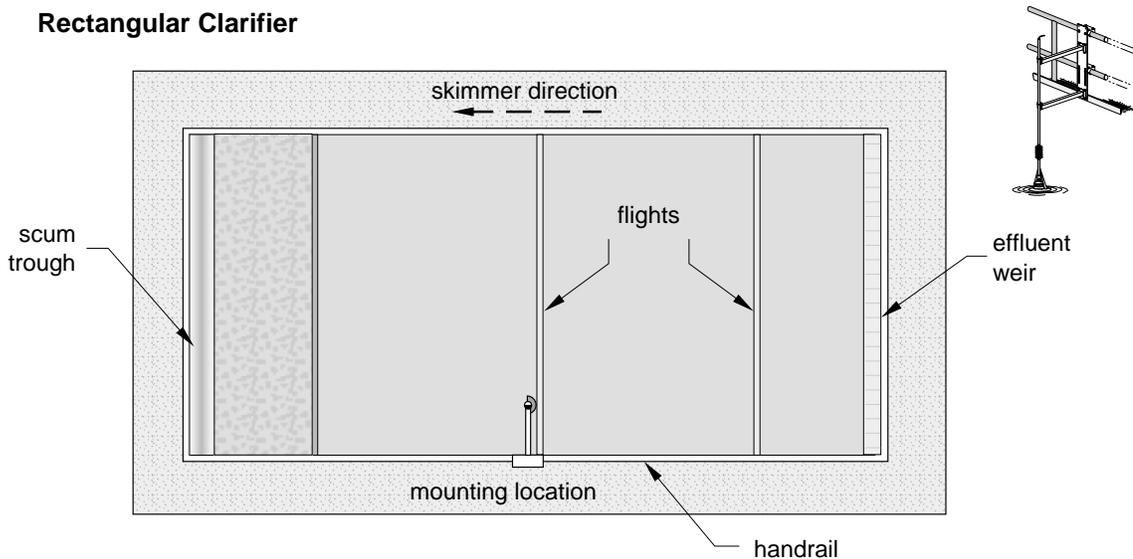
Ladders, Beams, Supports, etc.

Be sure that there are no underwater obstructions within 1 m (3') of the sensor that could disrupt the signal. Obtain drawings and/or consult with plant personnel to locate any of these structures that may not be visible.

Surface Skimmers

Skimmers are used to remove the scum from the surface of the water in the clarifier. They are usually short fences called “flights” that are pulled along the top of the water with a chain mechanism in rectangular tanks. The scum is skimmed away from the effluent weirs into a trough where it can be removed easily. It is important to observe the skimmer action when setting up the InterRanger. If the best location for the sensor is in the path of the skimmer then the optional Skimmer Guard must be used.

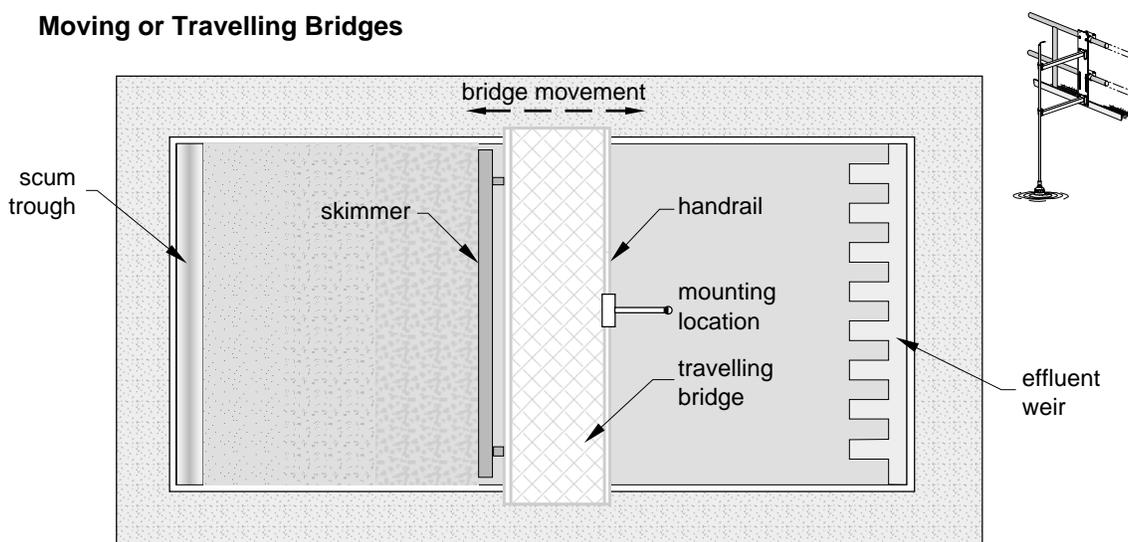
Rectangular Clarifier



Scrapers

Scrapers keep the oldest sludge on the bottom of the tank from hardening and help to move the sludge into a hopper for pumping. In rectangular tanks, often the scrapers are also the skimmers. They run along the bottom on a chain mechanism for the length of the tank, up the side and then along the top to pull the scum into a trough.

Moving or Travelling Bridges



For clarifiers with these types of arrangements, care must be taken in choosing a mounting location. The following items should be considered when choosing a location on the bridge:

- The transducer should be mounted behind (after) the surface skimmer (if present). This is to help minimize the amount of potential scum build-up on the transducer.
- The transducer should be mounted in front of the bottom scraper mechanism. The sludge becomes very disturbed after the passing of a bottom scraper and a clean interface will be difficult to detect. Mount the transducer in front of the scraper, not behind.
- The transducer should not be mounted near any siphoning-type outlet. Some clarifiers utilize a siphoning technique to maintain sludge levels. Do not locate the transducer near these outlets as the sludge is more disturbed there.
- Ensure the transducer will not come into contact with effluent weirs or scum troughs at either end of the bridge travel.

It is important to observe the bridge motion through at least one complete cycle to ensure that the transducer and/or the mounting assembly will not collide with any structures in the tank.

Location

An average sludge level reading will be displayed for the location at which the transducer is installed. This location may have to be compromised for practical reasons, pertaining to the physical installation of the transducer, and physical or operational characteristics of the clarifier.

We suggest these examples:

Skimmers

Where surface skimmers are in use, the optional Skimmer Guard should be used to protect the transducer and from passing skimmers.

If the Skimmer Guard is required, it can be field installed in a manner suitable for the clarifier installation and its surroundings. Consult with your mechanical department or contractor.

The Mounting Assembly provides a method of installing the transducer or Skimmer Guard to clarifier handrails.

Mounting

As mentioned, mounting of the transducer must take into account several considerations.

- vertical adjustment of the transducer so that it is immersed in the clarifier water 3 to 6 cm.
Milltronics Mounting Assembly provides this.
- horizontal adjustment of the transducer so that it can be extended away from the clarifier wall or handrail
Milltronics Mounting Assembly provides this.
- articulation of the transducer conduit so that, where skimmers are in use, the transducer is deflected out of the way as the skimmer passes.
Milltronics Skimmer Guard provides this.

APPLICATION EXAMPLE

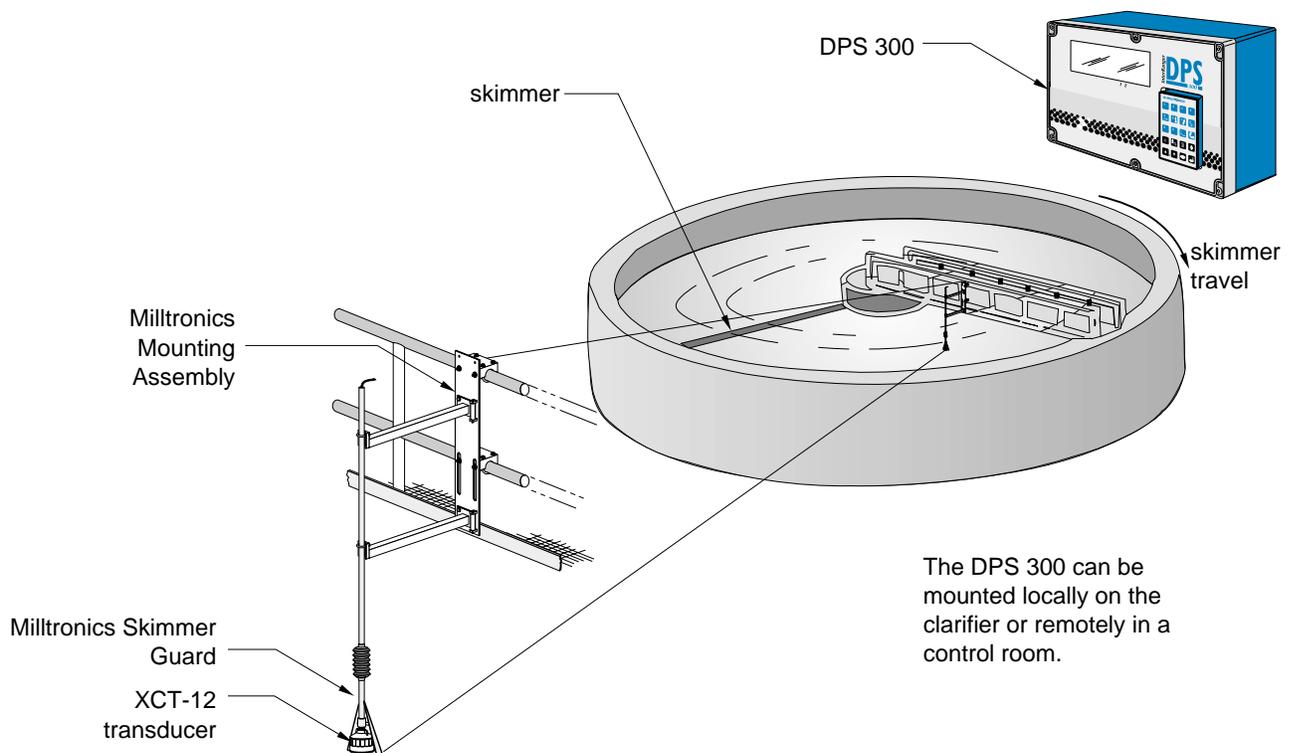
It is desired to measure the sludge blanket in a circular primary clarifier. The clarifier is equipped with a skimmer, and the depth of wastewater in the clarifier is approximately 5 m. When the sludge level rises to about 0.3 m, a pump turns on to pump out the sludge to a level of about 0.1 m. The pump is then turned off.

Set the following parameters as follows:

System requirements:

- one DPS 300*
- one XCT-12 transducer
- one Milltronics Skimmer Guard
- one Milltronics Mounting Assembly

*The DPS 300 is a dual point monitor, capable of measuring two clarifiers when the unit is equipped with two transducers. This example shows the unit used for single point monitoring but two could be used.



Note:

When powered up, the DPS 300 will take up to several minutes to lock onto its first measurement. During this time several errors may be reported. These errors should be ignored. If errors are reported after the startup period, consult the Troubleshooting section.

P001 = 1

sludge level measured from bottom (see P006)

P002 = 1

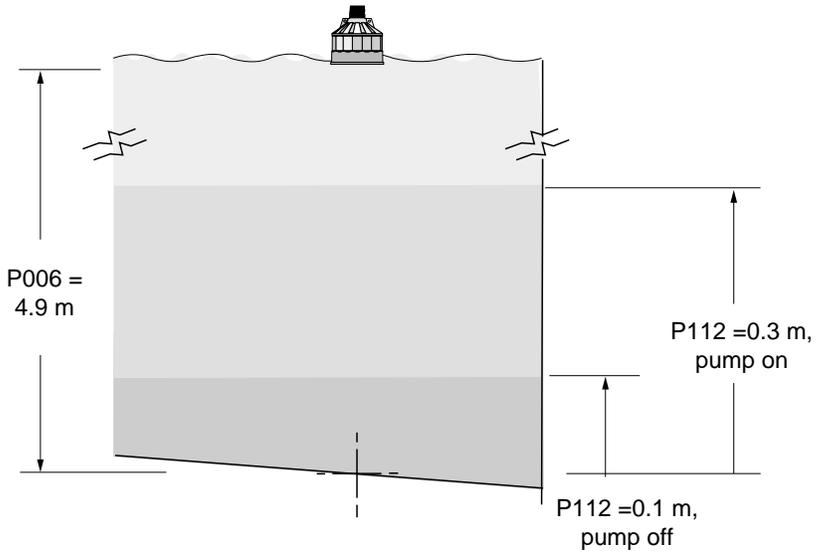
primary clarifier

P005 = 1

units in meters

P006 = 4.9,

distance from the face of the transducer to the bottom of the clarifier directly beneath



P110, relay 1 = 1

relay 1 is assigned to point 1

P111, relay 1 = 50,

relay 1 is assigned for pump control

P112, relay A setpoint = 0.3

sludge level at which the pump turns on

P113, relay B setpoint = 0.1

sludge level at which the pump turns off

Note:

Installation shall only be performed by qualified personnel, and in accordance with local governing regulations.

Location

Electronics

Although the Mounting Assembly provides a mounting plate for external installation, the unit can also be installed indoors in a controlled environment comfortable to operating personnel.

If it is required to mount the unit outdoors, the supplied panel can be attached to the Mounting Assembly.

Regardless, the unit must be mounted in an area that:

- is conformant to the units specifications
- provides clearance to swing open the front cover and perform the required wiring connections
- provides access for viewing
- is vibration free

Avoid a location that is:

- exposed to continuous direct sunlight. (Otherwise, provide a sun shield.)
- close to high voltage or current runs, contactors, or SCR control drives

Cable/Conduit Entry Requirements

Determine the number of conduit entries required:

- transducer(s) – one or two transducers
- communications – SmartLinx, RS-485, RS-232, bi-polar
- instrumentation – relay outputs, 4-20 mA
- synchronization – if more than one unit in proximity
- power

Note:

- Transducer cables must be run in a grounded metal conduit, separate from other wiring, (except TS-3 temperature sensor wiring, if applicable).
- This product is susceptible to electrostatic shock. Follow proper grounding procedures.

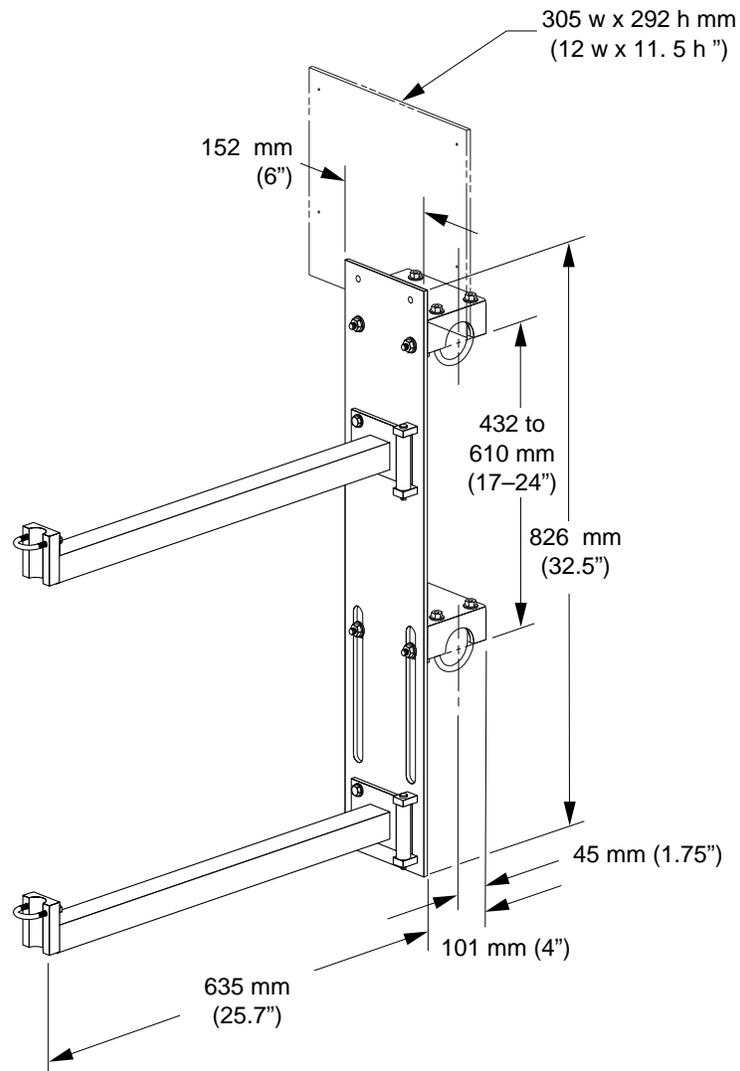
Transducer

As the transducer represents the point of measurement of the sludge blanket, it should be located where it can give a reliable and meaningful measurement.

The ideal location may be compromised due to structural considerations of the clarifier, and practicality of installation. Refer to Application Planning on page 15 for more information.

Optional Mounting Assembly

The mounting assembly provides an easy means of extending the transducer out into the clarifier wastewater by hanging off of nearby handrails.

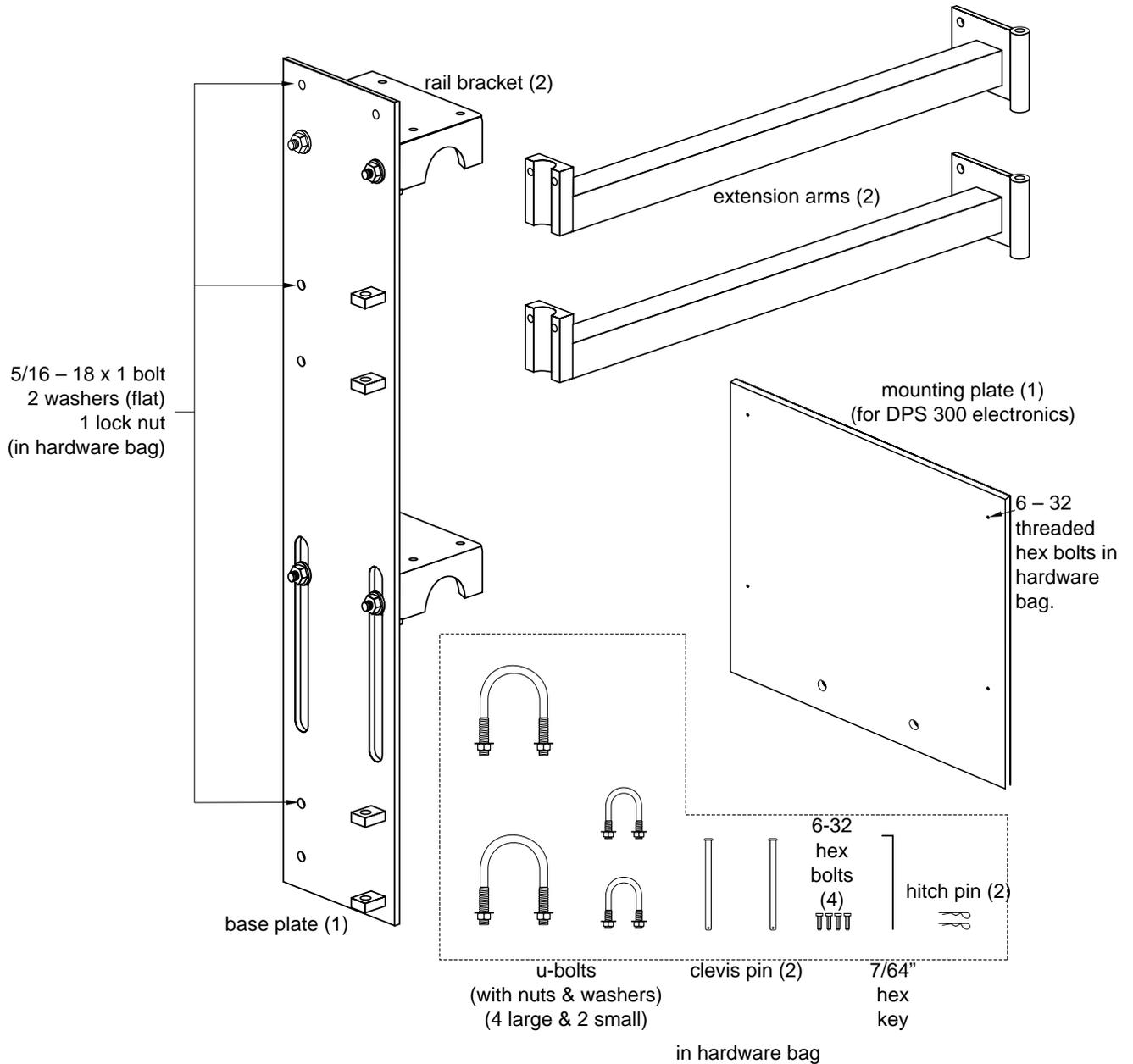


Mounting Assembly Usage

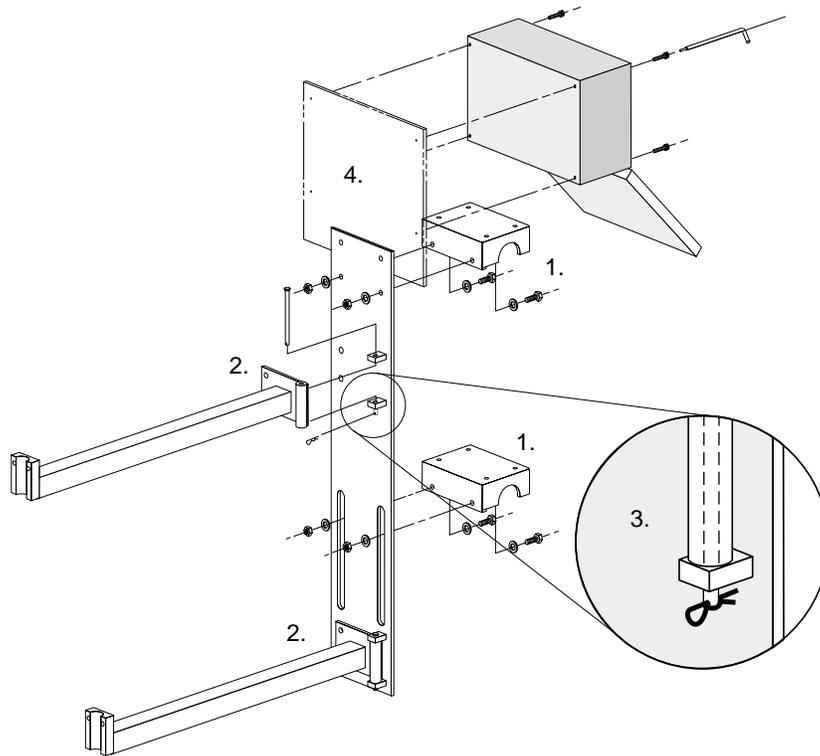
In clarifiers where skimmers are in use, the transducer must be raised to avoid damage from the passing skimmer. If you have a Milltronics Skimmer Guard, refer to that manual before installing the Mounting Assembly.

Refer to the DPS 300 system manual to determine the appropriate location for installing the Mounting Assembly.

Components

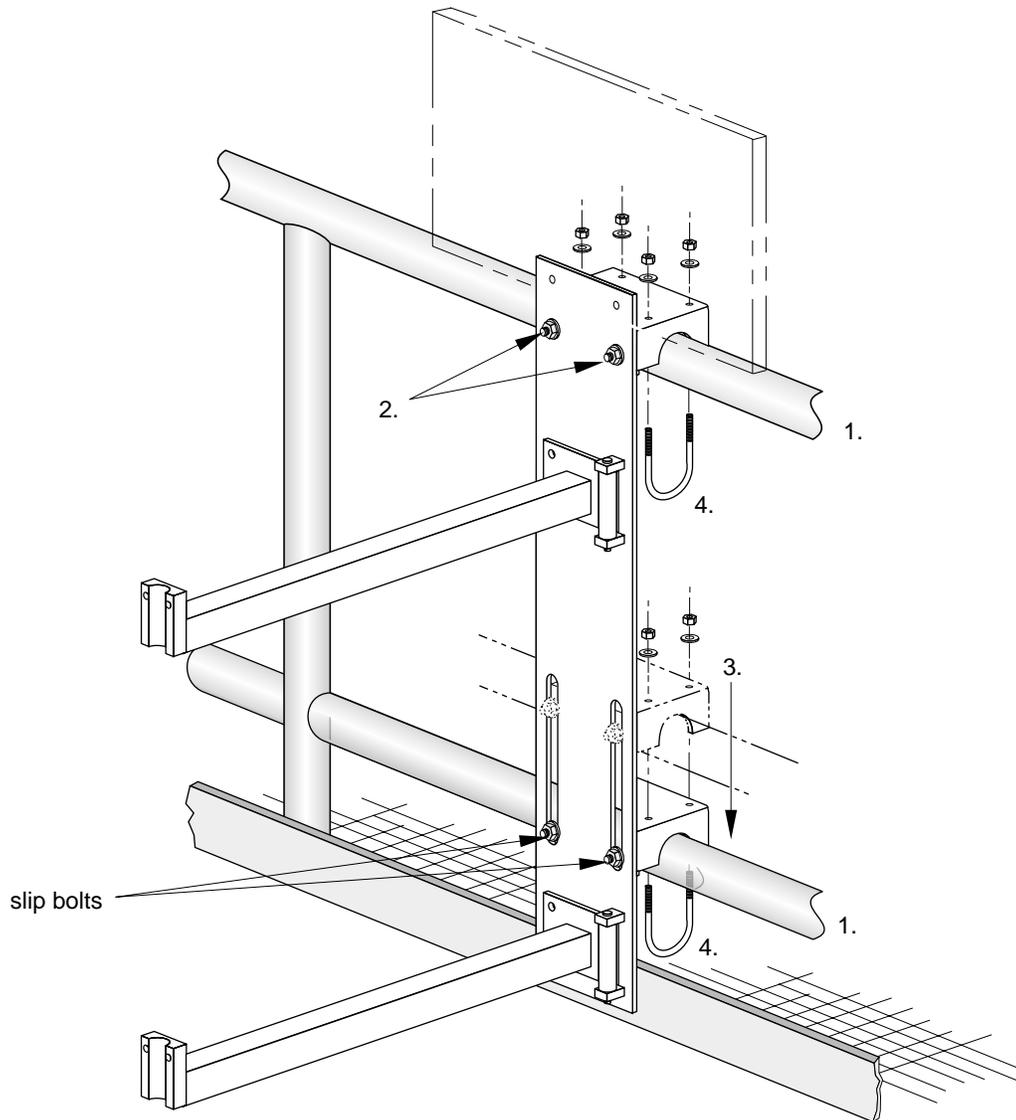


Assembling the Mounting Assembly



1. Assemble the rail brackets, upper and lower, to the base plate
2. Assemble the extension arms, upper and lower, to the base plate by mating the arm and plate hinges and inserting the hinge pins.
3. Secure each hinge pin by inserting a hitch pin through the hole at the end of the pin.
4. (Optional) If it is required to mount the DPS 300 at the clarifier, then attach the mounting panel to the base plate. Use the hex bolts provided to mount the DPS 300 to the mounting panel. The DPS 300 is pre-drilled with the appropriate holes.

Mounting Assembly Installation



1. Attach the Mounting Assembly to the clarifier handrail by hanging the upper and lower rail brackets from the upper and lower rails.
2. The upper rail bracket is fixed. Check that the bolts are securely fastened.
3. Slide the lower rail bracket in position so that it rests on the lower rail. Tighten the slip bolts to secure the bracket.
4. Insert the four larger u-bolts through the upper and lower brackets, clamping the brackets to the rails and fasten with the supplied washers and nuts.

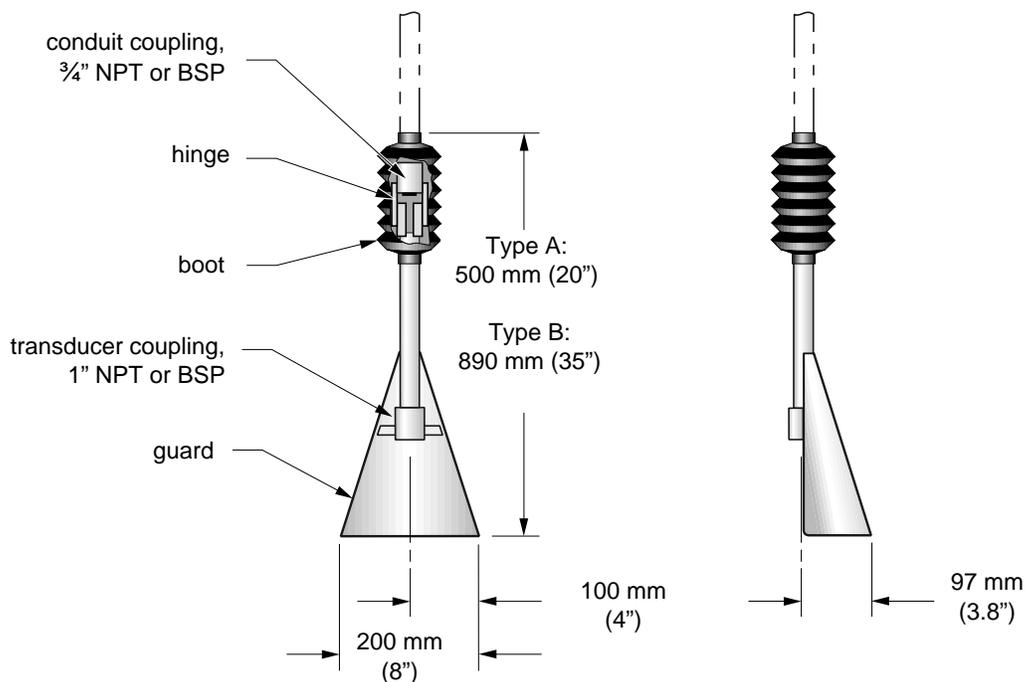
Optional Skimmer Guard

The skimmer guard is designed for use with transducers applied to measurement of sludge in wastewater clarifiers. The guard provides articulation of the mechanical and electrical conduit connection to the transducer where skimmers are in use.

As the skimmer passes, it contacts the skimmer guard and pushes it up and over the skimmer; effectively clearing the transducer out of harm's way. Once the skimmer has passed, the guard is free to fall, re-immersing the transducer into the clarifier water.

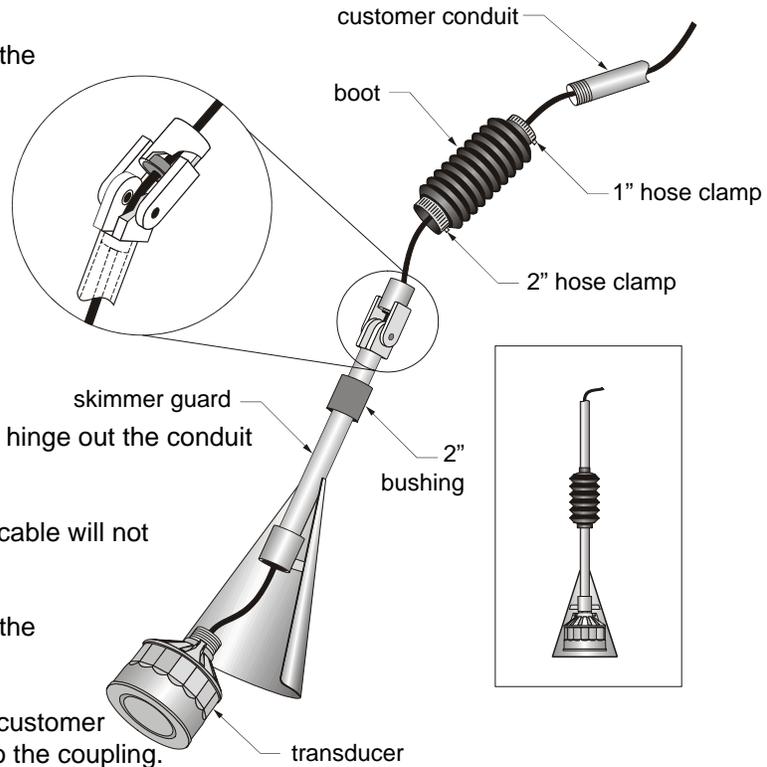
The skimmer guard is available in two sizes:

- Type A – for skimmers 20 cm (8") or less in cross-sectional height
- Type B – for skimmers 40 cm (16") or greater in cross-sectional height



Transducer Assembly

1. Procure a length of corrosion resistant conduit for suspending the transducer and skimmer guard assembly such that the transducer face will be immersed 3 to 6 cm into the clarifier water. Milltronics suggests $\frac{3}{4}$ " standard stainless steel pipe (schedule 10) cut with $\frac{3}{4}$ " NTP threads.
2. To facilitate running the transducer cable through the conduit, fish a wire through from the hinge end first.
3. Slide the 2-inch hose clamp over the knuckle of the Skimmer Guard.
4. Run the transducer cable through the skimmer guard; starting at the transducer coupling, through the conduit and out the hinge.
5. Pull the cable through until the transducer is pulled up to the mounting coupling.
6. Screw the transducer into the mounting coupling and tighten.
7. Run the transducer cable from the hinge out the conduit coupling.
8. Pull cable taught insuring that the cable will not get pinched in the hinge.
9. Run the transducer cable through the boot and customer conduit.
10. Slide the boot over the end of the customer conduit, and screw the conduit into the coupling.
11. Slide the boot over the hinge.



The transducer and skimmer guard are now ready for installation.

Location and Installation

If a Mounting Assembly is used ...

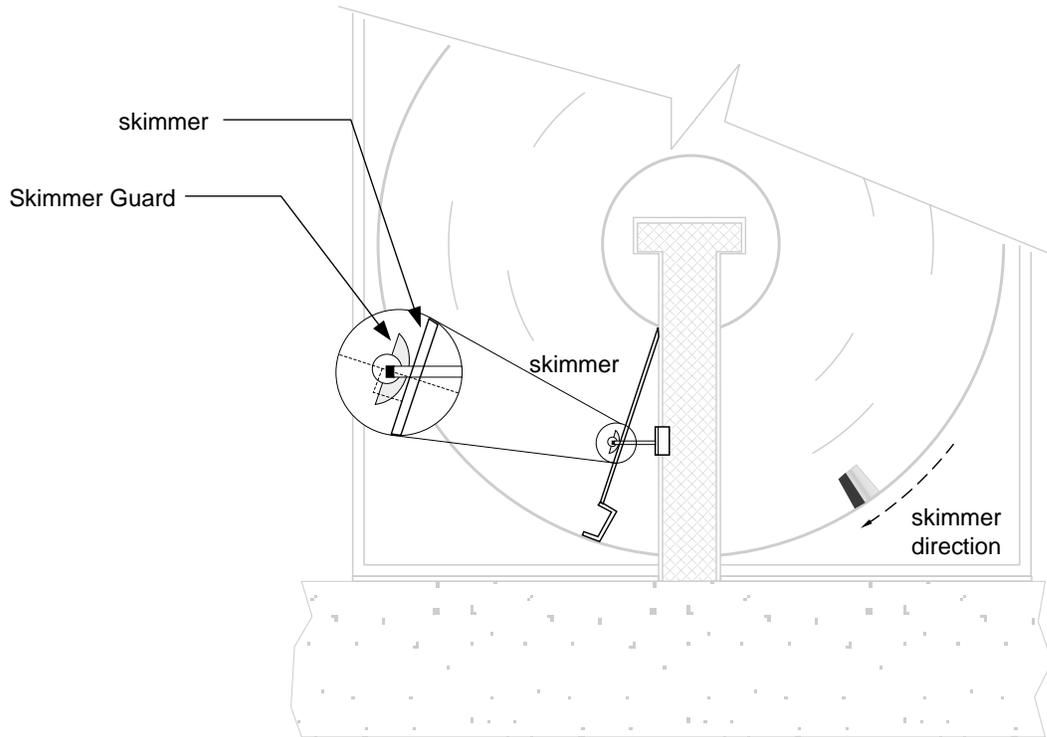
If a Milltronics mounting assembly is being used to mount the Skimmer Guard assembly, first refer to Optional Mounting Assembly on page 24.

For Location

For recommendations as to the preferred point of installation of the transducer and skimmer guard, refer to Application Planning on page 15.

Orienting the Skimmer Guard

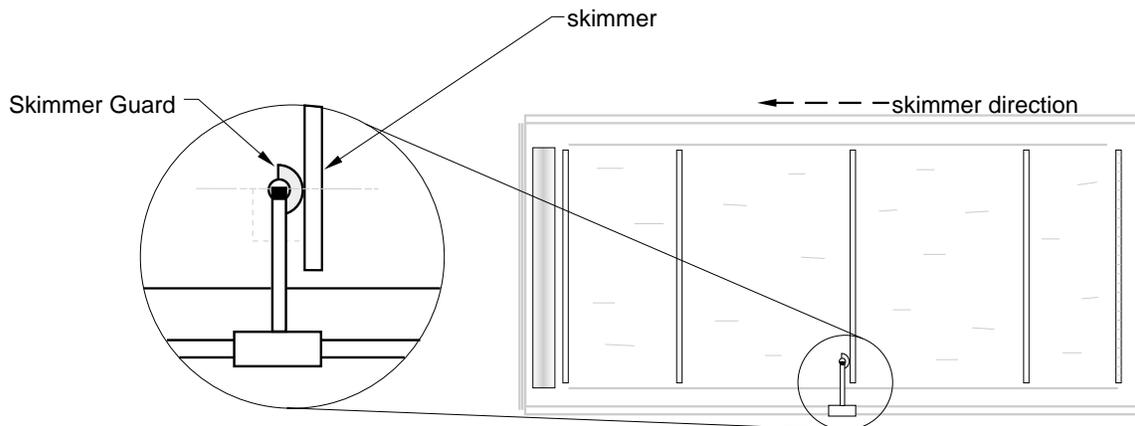
Circular Clarifier



Notes:

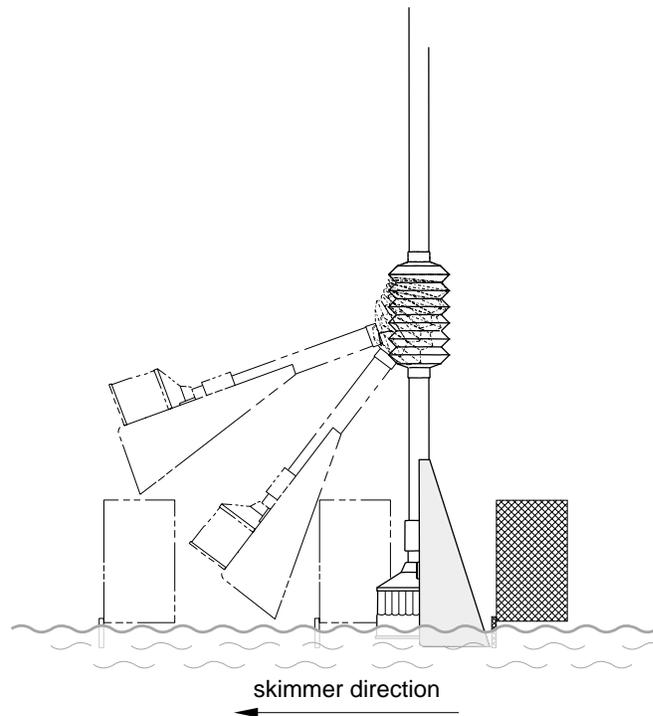
- The Skimmer Guard must be oriented so that the guard swings precisely in line with the skimmer's travel.
- Improper alignment will cause needless wear on the joint and stress on the Skimmer Guard, and could result in damage to the conduit, guard and the transducer.

Rectangular Clarifier



Operation

As the skimmer passes, it contacts the skimmer guard and pushes it up and over the skimmer; effectively clearing the transducer out of harm's way. Once the skimmer has passed, the guard is free to fall, re-immersing the transducer into the clarifier water.



Note:

Before leaving, run the skimmer to insure that the skimmer guard is operating properly.

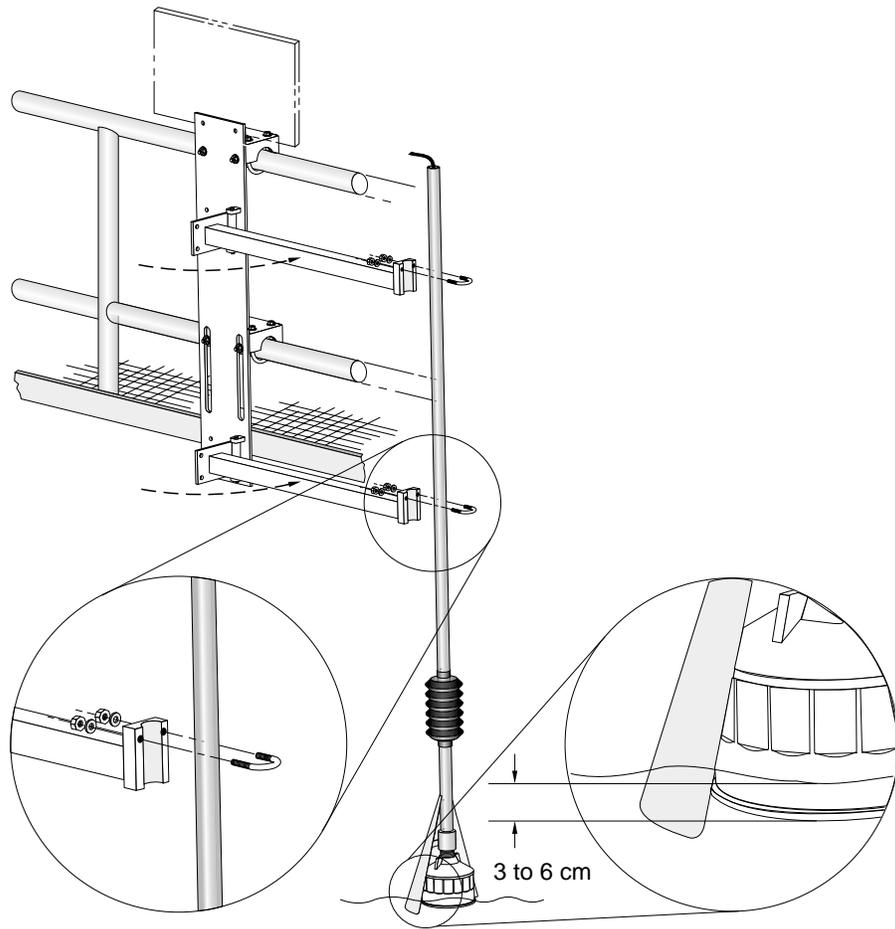
Transducer Mounting

Procure a length of corrosion resistant conduit for suspending the transducer* such that the transducer face will be immersed 3 to 6 cm into the clarifier. Milltronics suggests $\frac{3}{4}$ " standard stainless steel pipe (schedule 10) cut with $\frac{3}{4}$ " NTP threads.

* transducer or transducer and skimmer guard assembly. Refer to the Skimmer Guard instructions (above).

Note:

If skimmer is in operation, shut off until mounting is complete

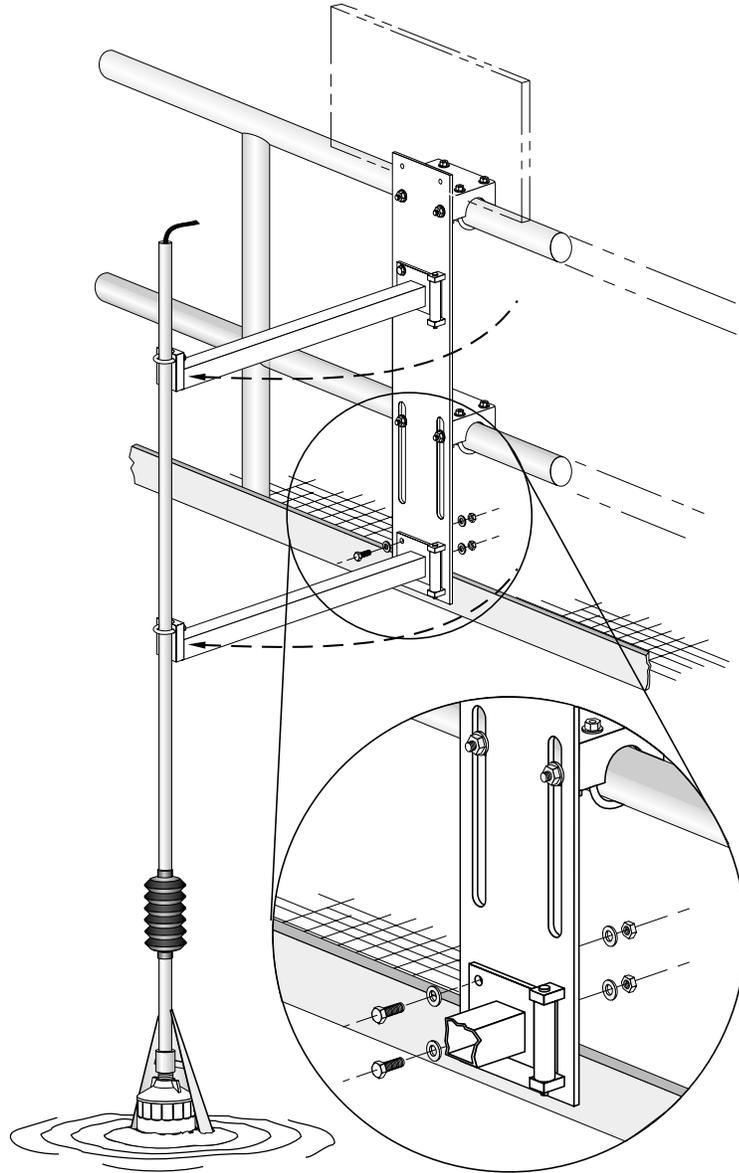


With the extension arms swung in towards the rail, clamp the conduit extension of the transducer assembly to the extension arm ends and snug tight using the two smaller U-bolts. Slide the conduit down so that the transducer face is immersed 3 to 6 cm into the clarifier water.

Note:

Run the transducer cable from the rigid conduit end, through a flexible conduit to the junction box (if required) in a manner that allows the extension arm to swing out fully.

Extending the Arms



Swing the extension arms (and transducer assembly) out 90 degrees into the clarifier and bolt the extension arm hinges to the chassis using the supplied washers and nuts.

Before Leaving

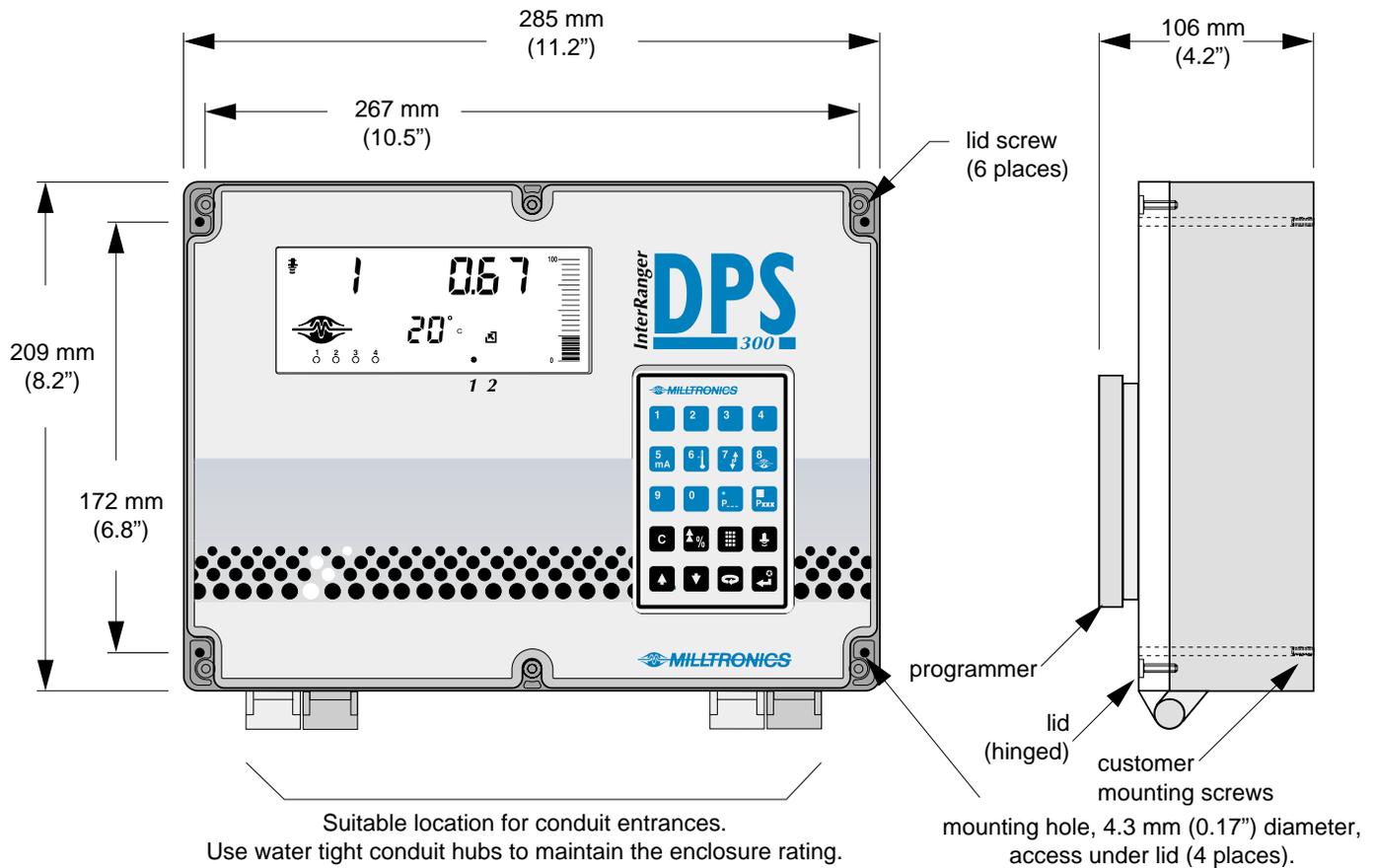
If a Milltronics Skimmer Guard is used, insure that it has been properly oriented in line with the skimmer's travel. Refer to the Skimmer Guard instructions.

Insure that the conduit clamping u-bolts are sufficiently tight to hold the conduit fixed.

Start the skimmer and let it pass by the Skimmer Guard (if used) to ensure that everything is well-positioned. See Orienting the Skimmer Guard on page 30 for more details. Make any necessary adjustments and tighten the 1" u-bolts securely. Finally, bolt the extension arms to the base plate.

Assembly

Mounting - Electronics



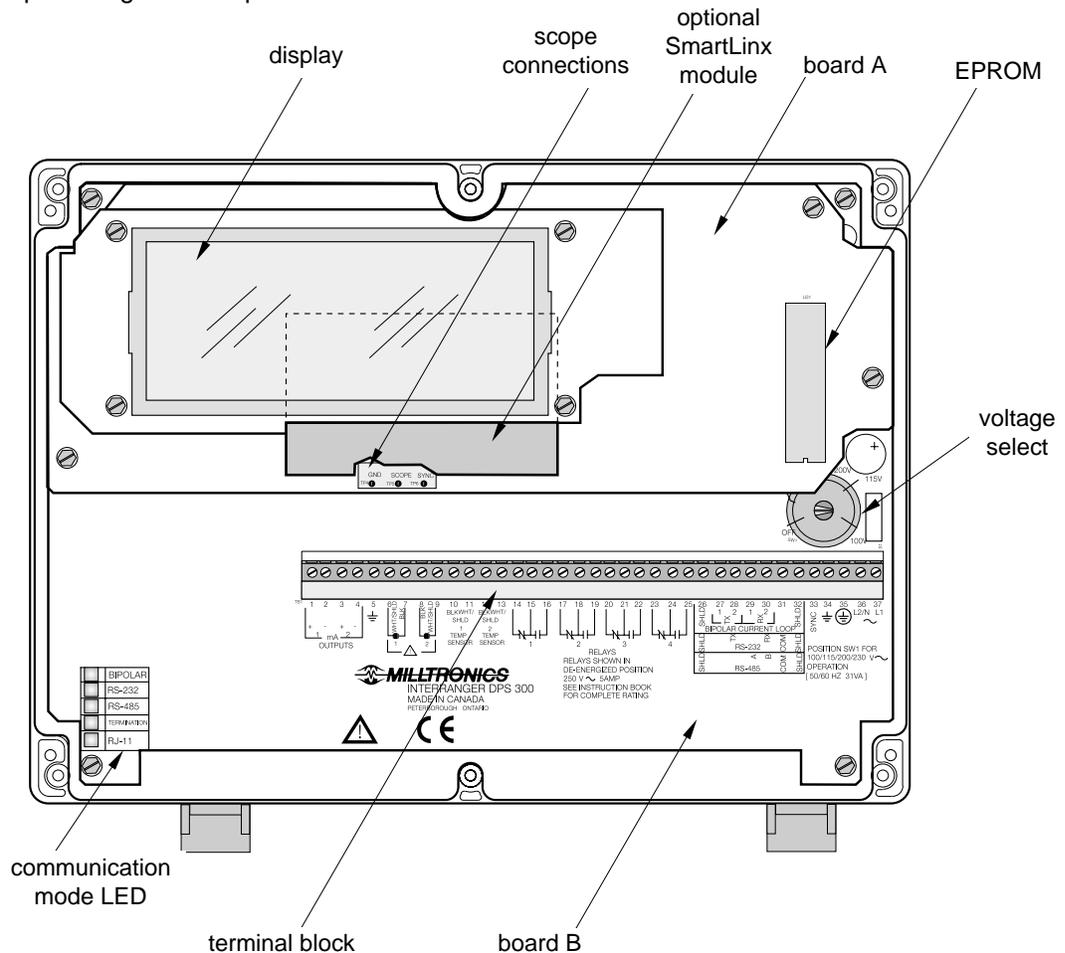
Note:

Non-metallic enclosure does not provide grounding between connections. Use grounding type bushings and jumpers.

Interconnection

Before interconnecting system components to the DPS 300 terminals, verify that all components have been installed in accordance with the associated product instruction manuals.

Connect all associated equipment cable shields to the DPS 300 shield connections. to avoid ground loops, ground shields only at one end. Insulate shields at junctions to prevent ground loops.

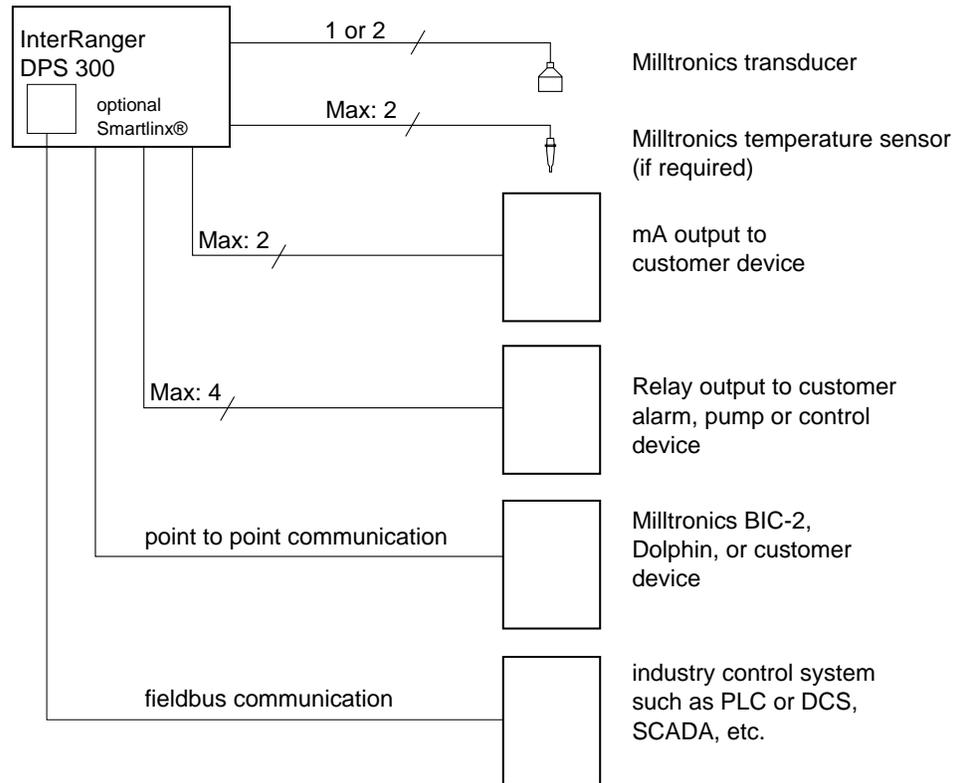


Warning:



- All field wiring must have insulation suitable for at least 250V.
- Hazardous voltage present on transducer terminals during operation
- Relay contact terminals are for use with equipment having no accessible live parts and wiring having insulation suitable for at least 250V.

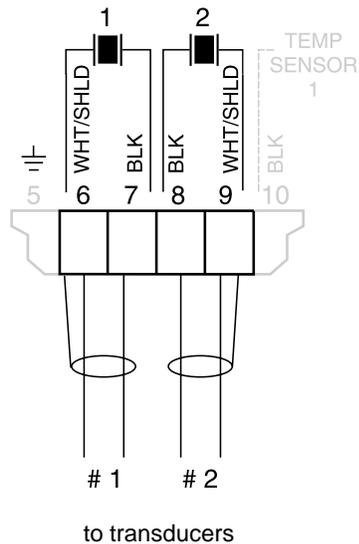
System Diagram



Note:

Maximum system capability. Not all components or their maximum quantity may be required

Transducer



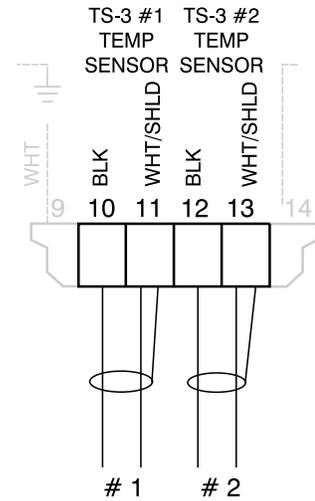
Warning:

Hazardous voltage present on transducer terminals during operation.

Temperature Sensor (if required)

Notes:

- Use TS-3 temperature sensors only. Don't jumper the terminals if TS-3's are not used.
- Maximum cable run to TS-3 is 365m (1200ft) using 18 AWG, 2 wire twisted/shielded.

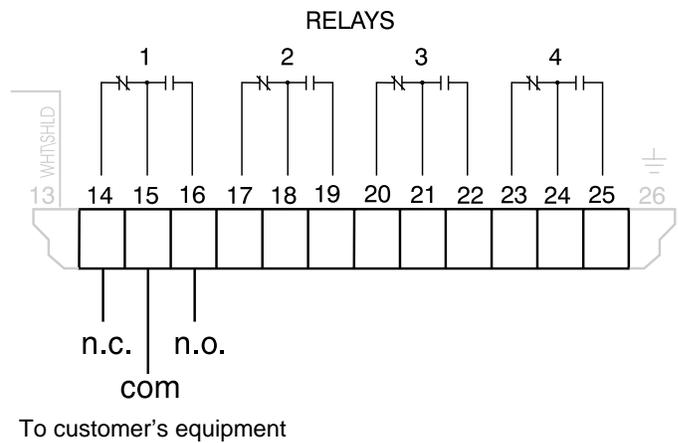


Relays

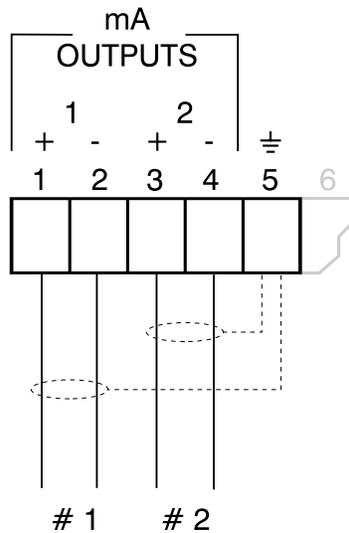
All relays are certified for use in equipment where the short circuit capacity of the circuits in which they are connected is limited by fuses having ratings not exceeding the rating of the relays.

Note:

Relays are shown in de-energized state.



mA Outputs



0/4—20mA isolated output to 750Ω max

Communication

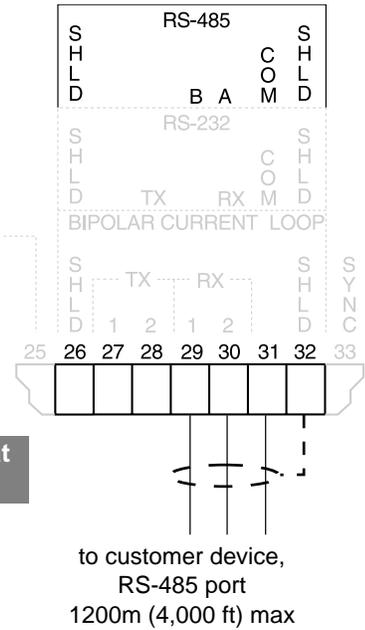
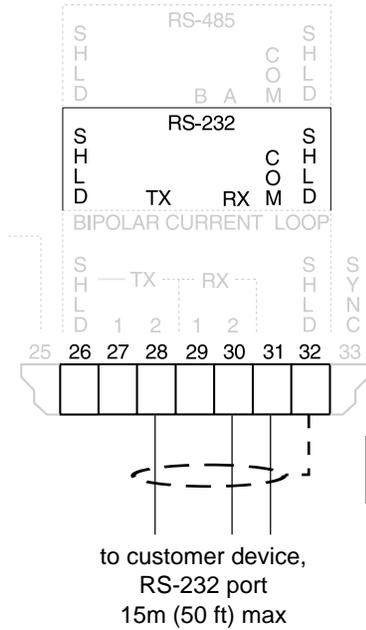
Note

The communication protocol is automatically detected by the DPS 300 and shown via LED on the motherboard.

Serial:

RS-232

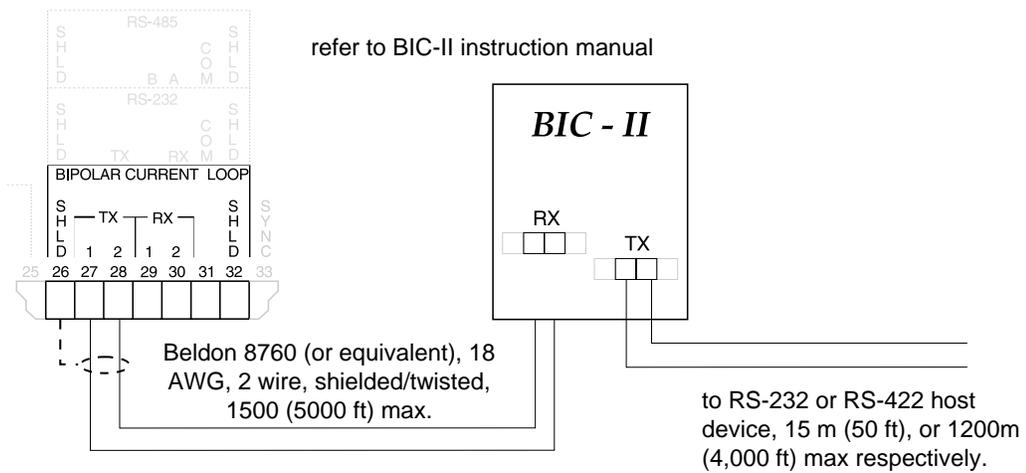
RS-485



Ground shield at one end only.

Bipolar Current

Connect the Milltronics BIC-II (if required) to the Peripheral Communications terminals as below.



SmartLinx

Refer to the appropriate SmartLinx manual for installation and wiring information.

Level System Synchronization

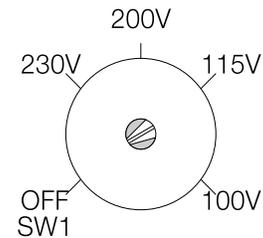
Avoid mounting the DPS 300 near another ultrasonic level monitor. Likewise, when more than one monitor is installed within a single plant/facility, ensure the transducer cables of each system are run in separate grounded metal conduits. If this system separation is impractical, or despite separation efforts measurement difficulties are encountered, system synchronization may be required.

Note:

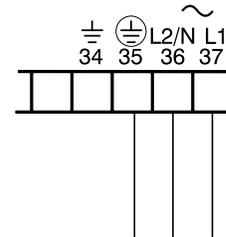
To synchronize the DPS 300 with other Milltronics ultrasonic level monitors contact Milltronics or your local distributor.

Power

Before making the power connection, ensure that the proper voltage selection is set.



The voltage selection switch is shown in the off position. Select the appropriate voltage.



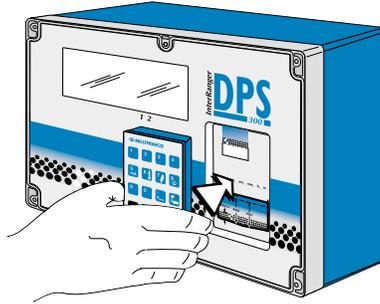
100 / 115 / 200 / 230, 50 / 60 HZ
select voltage via switch above

Notes:

- The equipment must be protected by a 15 A fuse or circuit breaker in the building installation.
- A circuit breaker or switch in the building installation, marked as the disconnect switch, shall be in close proximity to the equipment and within easy reach of the operator.
- Never operate the DPS 300 with the enclosure lid open, or with the ground (earth) wire disconnected.
- Ensure that any associated alarm or control equipment is disconnected until satisfactory operation is verified.

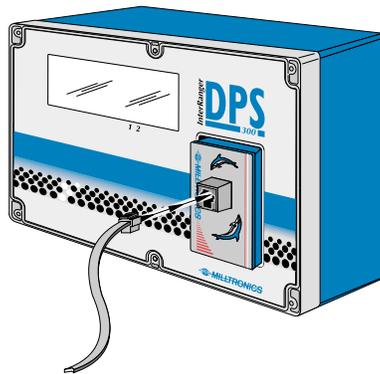
Programmer

The hand programmer fits into the docking bay and is kept there with a magnet. Use the hand programmer to change individual parameters.



Dolphin ComVerter

The ComVerter fits into the docking bay similarly to the hand programmer and provides communications with a PC running Dolphin Plus (available separately).



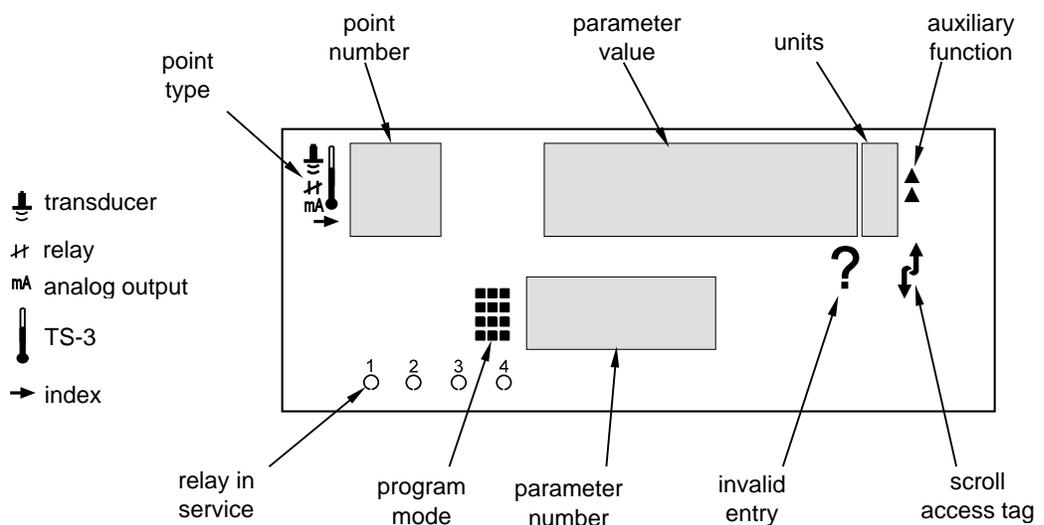
Operator programmable features are identified by a Point Number and Parameter Number. The Point Number refers to the Transducer (clarifier) Number, Relay Number, or mA Output Number as identified by the Point Type indicators. Parameter Numbers have a preset Parameter Value for each Point Number.

Programming is accomplished by altering the preset Parameter Values as required to obtain the RUN mode operation desired. All operator programmable features are defined in the Quick Start Parameters, Application Parameters, and Enhancement Parameters sections of this instruction manual.

Display

In the program mode, the Point Type, Point Number, Parameter Number, and Parameter Value (as well as a variety of other programming information) may be viewed.

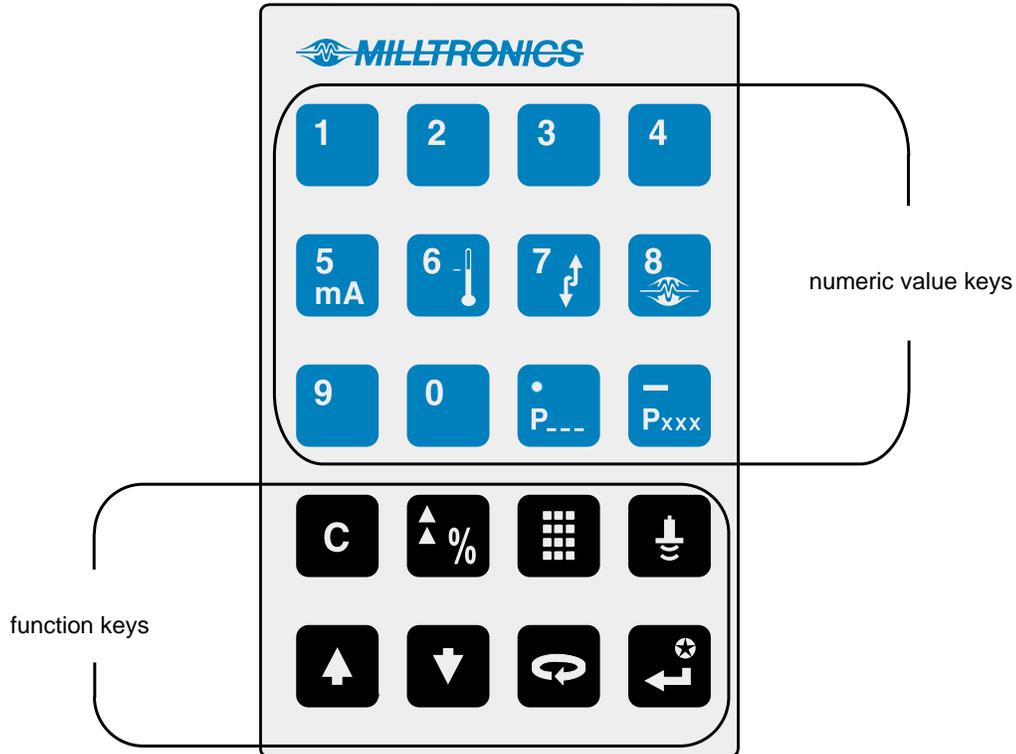
Note that many indicators are specific to certain programming conditions and therefore, not all indicators are displayed at any given time.



- Parameter Number* the programmable feature the Parameter Value pertains to.
- Point Type* the Point Number refers to a Transducer, Relay, mA Output, or TS-3.
- Point Number* the Transducer, Relay, mA Output or TS-3 # the Parameter Value pertains to.
- Parameter Value* the current value of the Parameter Number for the Point Number displayed.
- Percent* indicates the Parameter Value is displayed in percent.
- Invalid Entry* indicates the value entered is questionable (are you sure?).
- Auxiliary Function* indicates Auxiliary Function access (applies to only some Parameter Numbers).
- Scroll Access Tag* indicates the Parameter Value may be scroll accessed.
- Program Mode* indicates the program mode is accessed.

Keypad – Program Mode

In the program mode, use the DPS 300 programmer keys to perform the identified functions.



-  shift access to Point Number, Parameter Number, or Parameter Value display.
-  input the numeric value into the accessed display.
-  input a Parameter Value decimal point (moves Profile and TVT Pointers left).
-  input a negative Parameter Value (moves Profile and TVT Pointers right).
-  delete the current Parameter Value display (initiate a parameter reset).
-  store the current Parameter Value in memory (complete a parameter reset).
-  switch the Parameter Value to % or Units (access Auxiliary Parameter Function).
-  increase the accessed display value.
-  decrease the accessed display value.
-  take an ultrasonic measurement.
-  enter the RUN mode.

Program Mode Entry

Upon initial power application, the DPS 300 displays “OFF”.

To enter the program mode...

1. Ensure the enclosure lid is secured by the 6 captivated screws.
2. Place the infrared programmer in the enclosure lid recess (no wiring or fastening required).
3. Press   %

When the program mode is entered after RUN mode operation, all operating data is retained in memory. Relay status and mA output values are “held” at “last known” values (unless affected by a parameter alteration or  is pressed) until the RUN mode is re-entered. The RUN mode is automatically re-entered if the DPS 300 is left unattended in the program mode for an extended period.

Parameter Value Alteration

In the program mode...

1. Press  as required to underline the Parameter Number display field and...
 - a) Key in the desired Parameter Number, (**direct access**) or...
 - b) Press  or  as required (**scroll access**).

Note:

As preset, Quick Start Parameters, and previously altered parameters may be scroll accessed.

2. Press  as required to underline the Point Number display field and...
 - a) Key in the desired Point Number, (**direct access**) or...
 - b) Press  or  as required, (**scroll access**).

Note:

To alter the Parameter Value for all Point Numbers at once, select Point Number 00.

3. With the desired Parameter Number and Point Number displayed key in the desired Parameter Value and press 

Note:

- Record each Parameter Value alteration on the appropriate PROGRAMMING CHART for future reference, (especially should complete reprogramming be required).
- If Parameter Value alteration is not permitted, access the Lock parameter (P000) and enter the security code (See Programming Security).

Parameter Reset Features

On initial power up, all parameters are at “original” values. In many cases, when a Parameter Value is altered, associated Parameter Values are automatically altered accordingly. When a Parameter Number is accessed, if the preset Parameter Value displayed is acceptable, no entry is required.

To return an operator adjusted Parameter Value to the preset value, with the appropriate Point Number and Parameter Number displayed press  .

To reset numerous parameters to preset values, refer to Master Reset (P999).

Note:

Perform a Master Reset (P999) if the DPS 300 was “bench tested” using arbitrary Parameter Values before system installation, following an EPROM replacement, or whenever complete reprogramming is required.

Special Parameters

Some Parameter Values are for display purposes only and cannot be operator altered. These are referred to as *view only* parameters. In the parameters sections of this instruction manual, View Only parameters are identified by a “(V)” beside the Parameter Number.

Some Parameter Values must be common for all Point Numbers. These are referred to as *global* parameters. When a global parameter is accessed, the Point Number display automatically switches to Point Number 00, and returns to the Point Number previously selected when a non-global parameter is accessed. In the parameters sections of this manual, Global parameters are identified by a “(G)” beside the Parameter Number.

Programming Security

All operator programming is retained in non-volatile memory, immune to power interruptions. When programming is complete, the programmer may be removed and locked away to prevent inadvertent programming alteration. As well the Lock (P000) parameter may be used.

Security Parameter: P000 (G) Lock

Use this feature (if desired) to secure all programming from inadvertent alteration.

“Direct access” this parameter (it cannot be scroll accessed) after all programming is complete and enter any value (other than 1954) to activate the programming Lock.

When Lock is activated, the DPS 300 may be switched from the RUN mode to the program mode and the value of any parameter may be viewed but not altered. To unlock, access this parameter and enter the value “1954”.

This parameter cannot be reset by pressing  .

Values:

- 1954 = off (Parameter Value alteration permitted)
- 1 = control relays active during simulation
- other = activated (programming secured)

QUICK START PARAMETERS

Alter the Quick Start Parameters as required to suit the installation requirements.

Refer to the Application Example for assistance, if required.

Note:

When powered up, the DPS 300 will take up to five minutes to lock onto its first measurement. During this time several errors may be reported. These errors should be ignored. If errors are reported after the five-minute startup period, consult the Troubleshooting section.

P001 Operation

Enter the type of RUN mode operation desired.

Select:

- “level”, display Empty (P006) to sludge level distance.
- “space”, display Span (P007) to sludge level distance.
- “distance”, display transducer face to sludge level distance.
- “out-of-service” the transducer is not scanned, alarm relay(s) energize, pump relay(s) de-energize, and mA output(s) go to the Empty value.

Values:

- 0 = out-of-service
- 1 = level (preset)
- 2 = space
- 3 = distance

P002 Material

Enter a value for the type of clarifier being monitored.

The DPS 300 will detect the sludge interface in a variety of applications. Select the appropriate value from the list below for the DPS 300 mounting and clarifier type that most closely matches your application.

Note:

Several other parameter values are preset by P002. See DEFAULT PARAMETER SETTINGS on page 111 for a complete list.

Demonstration

- 0 = For demonstration purposes in air only.

Primary Wastewater Clarifiers

- 1 = Stationary mounting with surface skimmers and bottom scrapers (preset).
- 2 = Stationary mounting with bottom scrapers only.
- 3 = Rectangular clarifier with travelling bridge arrangement.
- 4 = Circular clarifier with rotating bridge arrangement.

Secondary Wastewater Clarifiers

- 5 = Stationary mounting with surface skimmers and bottom scrapers.
- 6 = Stationary mounting with bottom scrapers only.
- 7 = Stationary mounting without surface skimmers or bottom scrapers.
- 8 = Rectangular clarifier with travelling bridge arrangement.
- 9 = Circular clarifier with rotating bridge arrangement.

Potable Water Clarifiers

- 10 = Stationary mounting with bottom scrapers only.
- 11 = Stationary mounting without skimmers or scrapers.
- 12 = Rectangular clarifier with travelling bridge arrangement.
- 13 = Circular clarifier with rotating bridge arrangement.

Mining Clarifiers

- 14 = Stationary mounting with bottom scrapers only.
- 15 = Stationary mounting with surface skimmers and bottom scrapers.

Settling Tanks

- 16 = Stationary mounting without skimmers or bottom scrapers
(suspended solids >1%)
- 17 = Stationary mounting without skimmers or bottom scrapers
(suspended solids <1%)

P005 (G) Units

Enter the units of measure desired for programming Empty (P006) and Span (P007).

Values:

- 1 = meters (m) (preset)
- 2 = centimeters (cm)
- 3 = millimeters (mm)
- 4 = feet (ft)
- 5 = inches (in)

P006 Empty

Enter the *maximum distance* (transducer face to clarifier bottom) to be measured, in Units.

This value is preset to 4.000 m or equivalent Units (P005).

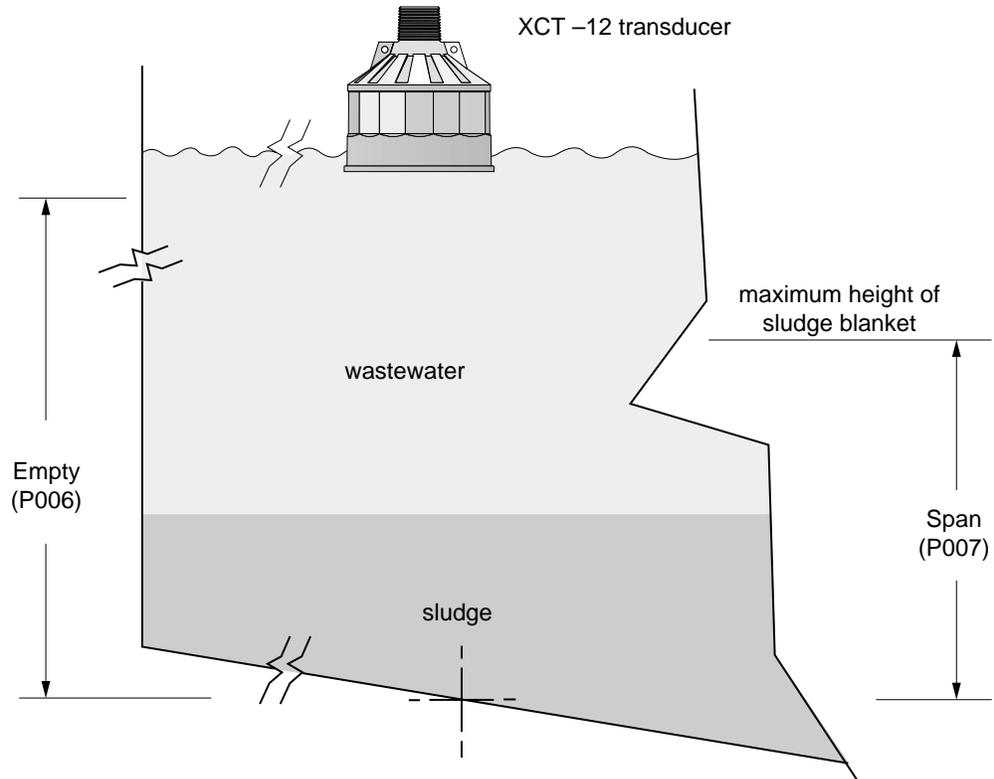
The value entered automatically sets Span (P007) to the maximum recommended value.

Values: 0.000 to 9999

P007 Span

Enter the maximum surface distance from Empty (P006).

Span is automatically preset to 3.000 m or equivalent Units (P005).



Values: 0.000 to 9999

Note:

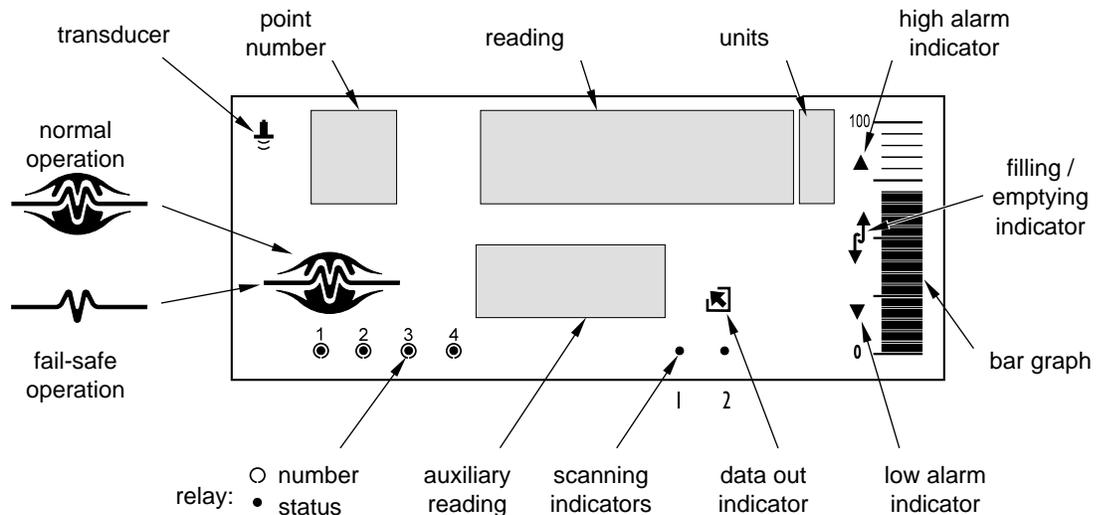
With the Quick Start Parameters altered as required, proceed to OPERATION to identify / verify basic system performance.

With Quick Start parameter alteration complete, the DPS 300 may be put into operation. (If APPLICATION or ENHANCEMENT PARAMETERS are altered, OPERATION is altered accordingly from that indicated).

Display

In the RUN mode, the following values and indicators may be observed.

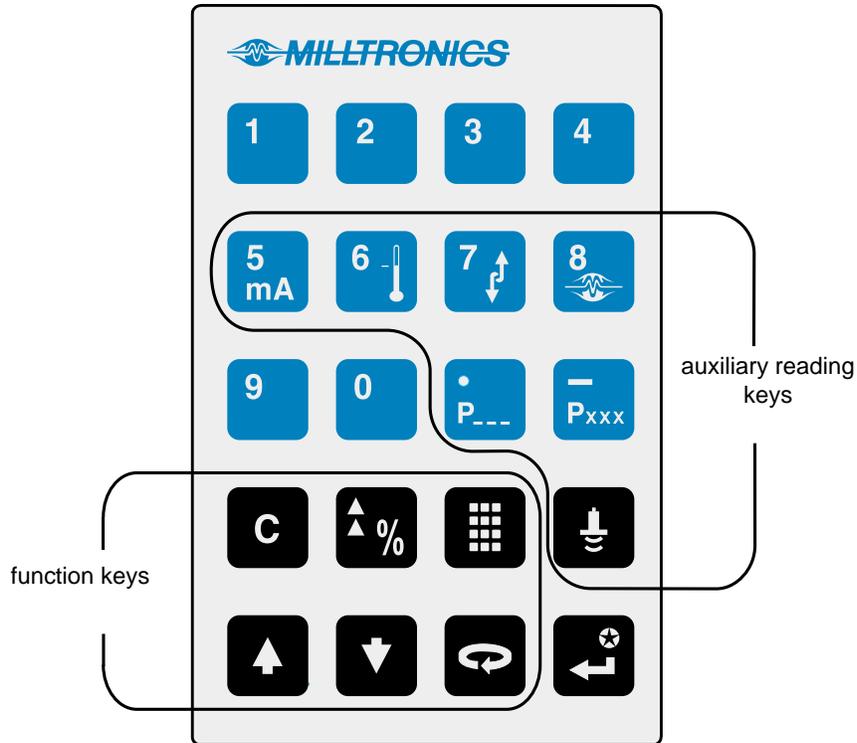
Note that many indicators are specific to certain operating conditions and therefore, **all indicators are not displayed at any given time.**



<i>Transducer</i>	the current display pertains to a transducer measurement.
<i>Point Number</i>	the Point Number (1 or 2) the current display pertains to.
<i>Reading</i>	displays the level, space, or distance (flashes error messages, if any).
<i>Percent</i>	the Reading is in percent.
<i>High Alarm</i>	indicates sludge level has risen above 80% (and not yet fallen below 75%).
<i>Low Alarm</i>	indicates sludge level has fallen below 20% (and not yet risen above 25%).
<i>Filling Indicator</i>	indicates the sludge level is rising.
<i>Emptying Indicator</i>	indicates the sludge level is lowering.
<i>Bar Graph</i>	indicates the absolute (always a positive value) sludge level from 0 to 100%.
<i>Data Out</i>	indicates the DPS 300 is transmitting data to the Communications terminals.
<i>Scanning Indicators</i>	indicate the Point Number scanned (independent from the Point Number display).
<i>Auxiliary Reading</i>	as selected by the keypad (terminal numbers if transducer or TS-3 is wired wrong).
<i>Relay Number</i>	indicates the relays programmed for operation.
<i>Relay Status</i>	indicates the relay is de-energized (alarm is activated).
<i>Normal Operation</i>	indicates operating conditions are good and the Reading is reliable.
<i>Failsafe Operation</i>	indicates operating conditions are poor and the Reading may be incorrect.

Keypad – Run Mode

In the RUN mode, the following programmer keys perform the identified functions.



-  selects the Auxiliary Reading “mA output value for the Point Number displayed”.
-  selects the Auxiliary Reading “clarifier wastewater temperature”.
-  selects the Auxiliary Reading “rate of sludge level change”.
-  selects the Auxiliary Reading “failsafe time left” (in percent).
-  selects the Auxiliary Reading “parameter value” (Key in any Parameter Number).
-  selects the Auxiliary Reading “sludge level” (may be operator altered via P731).
-  selects the Auxiliary Reading “distance” (sludge level to transducer face).
-  initiates program mode access (see ).
-  switches the Reading between “Units/percent of Span” (completes program mode access).
-  stops/starts the Point Number auto display scroll.
-  selects the next Point Number (when auto display scroll is stopped).
-  selects the previous Point Number (when auto display scroll is stopped).

System Performance Evaluation

For initial RUN mode entry (or after any programming alteration), do not use the DPS 300 to operate process control equipment until satisfactory system programming and performance is verified.

1. Press  to enter the RUN mode.

“----” may be displayed briefly while the DPS 300 takes measurements and calculates the Reading.

If an alarm symbol is displayed, the corresponding relay is de-energized.

POINT #	ALARM INDICATOR	RELAY #
1	High Alarm	1
1	Low Alarm	2
2	High Alarm	3
2	Low Alarm	4

2. Press  to display Readings in % (percent of Span, P007) based upon Operation (P001).

OPERATION	LEVEL	SPACE, or DISTANCE*
Empty to Full =	0 to 100%	100 to 0%

* Objects close to the transducer face (0%) are not detectable.

3. Press  to observe the mA output value for the Point Number displayed (Auxiliary Reading).

OPERATION	LEVEL	SPACE, or DISTANCE*
Empty to Full =	4-20 mA	20-4 mA

* Objects close to the transducer face (4 mA) are not detectable.

4. Press  to observe the *Failsafe Time Left* (time left in percent before failsafe activation).

Each time a valid measurement is made for the Point Number displayed, this value (Auxiliary Reading) is reset to 100 and begins to fall toward 0 until the next valid measurement is made.

If the Failsafe Time Left reaches 0, the DPS 300 flashes “LOE” in the Reading display.

All associated data is supplied to the Peripheral Communications terminals (27 and 28). If a BIC-II is connected, refer to TECHNICAL REFERENCE / Communication Support for message format and protocol information.

Performance Test Results

Monitor system performance carefully, under all anticipated operating conditions.

- A. If the DPS 300 performs exactly as required, copy all Parameter Value alterations to the PROGRAMMING CHARTS in the back of this instruction manual. (Altered Parameter Values may be scroll accessed). No further action is required.
- B. If a measurement difficulty is encountered (the “LOE” display persists after start up), or performance does not meet installation requirements, proceed to the TROUBLESHOOTING GUIDE.
- C. If the DPS 300 provides accurate and repeatable measurements, however alternate Reading units, failsafe action, relay, or mA output operation is desired, proceed to APPLICATION PARAMETERS.

If all operating conditions cannot be observed during the System Performance Evaluation, refer to ENHANCEMENT PARAMETERS / Reading Measurement (P920). Perform a Reading Measurement simulation to verify programming.

Ensure the PROGRAMMING CHARTS are altered accordingly, and a new System Performance Evaluation is conducted, following any operation alteration or measurement difficulty remedy.

Note:

Connect (or enable) process control / alarm equipment to the DPS 300 only after satisfactory performance is verified for all possible operating conditions.

APPLICATION PARAMETERS

This section identifies the DPS 300 operator programmable features which may be used to modify the DPS 300 display, failsafe, relay, and/or mA output operation.

Volume Parameters (P050 to P055)

If Readings proportional to volume are desired, adjust the following parameters

P050 Tank Shape

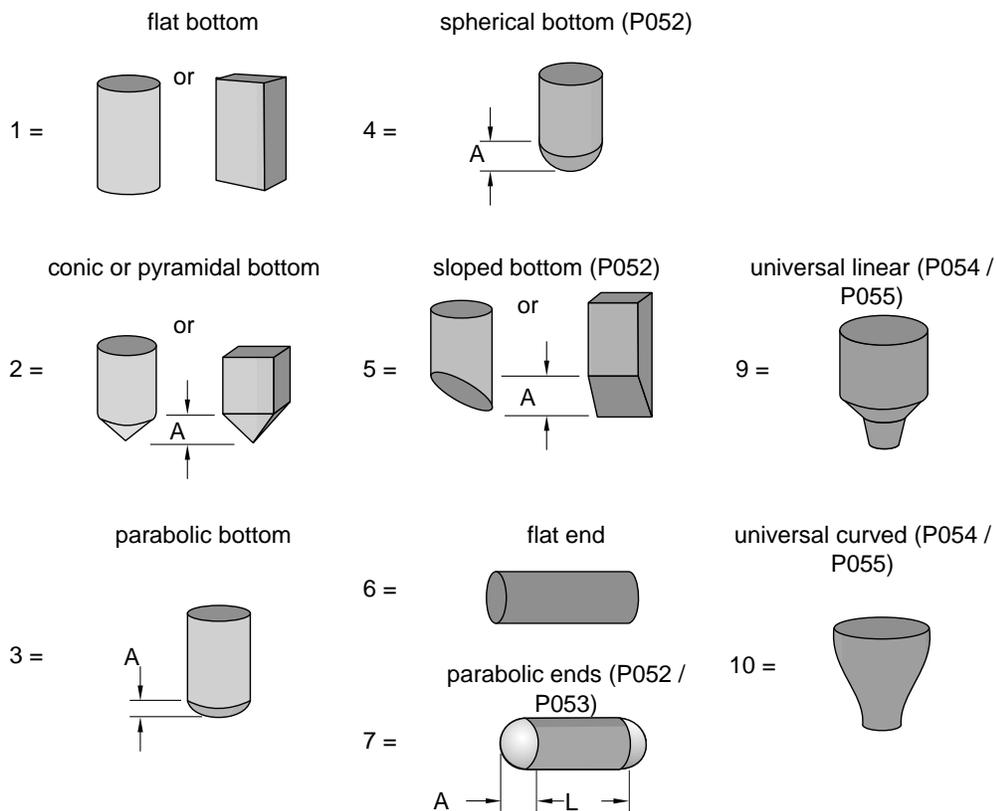
Enter the shape option that matches the clarifier monitored.

If the shape option selected, requires additional clarifier dimension entry, the *associated parameters* (as indicated below) may be scroll accessed.

When Operation is "level" (P001 = 1), sludge volume is calculated. Alternatively, when Operation is "space" (P001 = 2), remaining volume capacity is calculated.

In the RUN mode, Readings are displayed in percent of (and mA outputs are proportional to) maximum volume. to convert Readings to volumetric units, see Max Volume (P051).

Values: 0 = volume calculation not required (preset)



P051 Max Volume

Use this feature to display the Reading in volumetric units rather than percent.

Enter the clarifier volume between Empty (P006) and Span (P007).

e.g. 1 If the volume = 3650 m³, enter 3650.

e.g. 2 If the volume = 267,500 US gallons, enter 267.5 (1000's of gallons).

Values: 0.000 to 9999

P052 Clarifier Dimension A

Enter the height as depicted if P050 = 2,3,4, or 5, or the length of one end if P050 = 7, in Units (P005).

Values: 0.000 to 9999

P053 Clarifier Dimension L

Enter the length as depicted (excluding both end sections) if P050 = 7, in Units (P005).

Values: 0.000 to 9999

P054 Level Breakpoints (Universal Volume Calculation)

Enter level breakpoints* (here volume is known) if P050 = 9 or 10.

Values: 0.000 to 9999

P055 Breakpoint Volumes (Universal Volume Calculation)

Enter the volume* corresponding to each Level Breakpoint entered.

Values: 0.000 to 9999

*** to enter a Level Breakpoint or Breakpoint Volume...**

1. Press    to display the index symbol, .
2. Scroll ( or ) , or direct access the desired Breakpoint.
3. Key in the desired level or volume value.
4. Press. .

Note:

Refer to TECHNICAL REFERENCE / Volume Calculation for breakpoint value selection.

Reading Parameters (P060 to P062)

If Reading alteration is required, alter the following parameters to:

- alter the number of decimal places displayed.
- convert to units other than Units (P005), % of Span (P007), or Max Volume (P051).
- reference measurements to some point other than Empty (P006) or Span (P007).

Note:

If alteration is not required, proceed to FAILSAFE PARAMETERS.

P060 Decimal Position

Enter the maximum number of decimal places to be displayed in the Reading.

In the RUN mode, the number of decimal places displayed is automatically adjusted (if necessary) to prevent the number of Reading digits from exceeding display capabilities.

This value is automatically altered when Units (P005) or Max Volume (P051) are altered.

Values:

- 0 = no digits after the decimal point
- 1 = 1 digit after the decimal point
- 2 = 2 digits after the decimal point
- 3 = 3 digits after the decimal point

P061 Convert Reading

Enter the value to multiply the Reading by, (before display).

This feature is preset to 1.000 (no conversion).

e.g. If the Reading is currently displayed in feet, to display in yards, enter 3.

Note:

Avoid entering a value that, when multiplied by the maximum current Reading, could exceed 5 digits before the Decimal Position.

Values: -999 to 9999

P062 Offset Reading

Enter the value to be added to the Reading, (before display).

This feature is preset to 0.000, (no offset).

This feature affects the DPS 300. Reading only. (Relays and mA outputs are not affected).

Values: -999 to 9999

Failsafe Parameters (P070 to P072)

As preset, in the event of a measurement or technical difficulty, the DPS 300 holds the Reading, Bar Graph, mA outputs, and relays at their last “known” values.

To operate process control equipment under these conditions, alter the following parameters as required.

Note:

If alternate Failsafe Operation is not required, proceed to RELAY PARAMETERS.

P070 Failsafe Timer

Enter the time to elapse (in minutes), upon a difficulty, before failsafe operation is activated.

In the RUN mode, when a difficulty first occurs, the Reading, Bar Graph, relay status, and mA outputs are held at “last known” values and the Failsafe Timer is activated.

When a valid measurement is made before the timer expires, the DPS 300 advances to the “new” material level (if changed) and the timer resets.

If the timer expires (before a valid measurement is made), the DPS 300 advances to the Failsafe Material Level (P071) as restricted by Failsafe Advance (P072).

When a valid measurement is made after the timer expires, the DPS 300 advances to the “new” sludge level (if changed), as restricted by Failsafe Advance (P072) and the timer resets.

If the timer expires due to a measurement difficulty, “LOE” flashes in the Reading display.

Technical difficulty messages flash in the Reading display before the timer expires. The offending terminal connections are displayed in the Auxiliary Reading display.

DISPLAY	CAUSE
“LOE”	weak echo (see TROUBLESHOOTING GUIDE).
“Short”	short circuited transducer cable, or defective transducer
“OPEn”	open circuited transducer cable, or Point Number is scanned but a transducer is not connected, or defective transducer
“Error”	reversed Ultrasonic/Temperature transducer terminal connections or wrong Transducer (P004) entered.

Note:

While a short duration Failsafe Timer value may be required (when process control equipment is used) avoid entering a value so short as to cause nuisance activation.

Values: 0.000 to 9999

P071 Failsafe Material Level

Select the material level to be reported when the Failsafe Timer expires.

If “*HOLD*” (preset) is selected, in the RUN mode, the “last known” sludge level is held.

If “*HIGH*” or “*LOW*” are selected, the DPS 300 advances to the Span (P007) level or Empty (P006) level as restricted by Failsafe Level Advance.

Select the Failsafe Material Level based upon the relay and/or mA output operation required during failsafe operation.

e.g.1 To de-energize a high alarm relay select “*HIGH*”.

e.g.2 To force an “empty level” mA output (perhaps to have pumps stopped), select “*LOW*”.

To select HIGH, LOW, or HOLD...

1. Press  to display the Auxiliary Function symbol,
2. Press  or  as required to scroll access the desired option,
3. Press .

Alternatively, a specific Failsafe Material Level within -50 to 150% of Span (P007) may be entered directly in Units (P005), or % of Span (P007).

Values: -999 to 9999

P072 Failsafe Level Advance

Select the restriction applied to the DPS 300 advance to (and from) the Failsafe Material Level.

When “restricted” (preset), the DPS 300 advances to the Failsafe Material Level (and to the “new” material level when a valid measurement is made) at the Max Fill/Empty Rate (P700/P701) to a maximum of 0.1 m/min

Alternatively, when “immediate” is selected, the Failsafe Material Level (or “new” material level) is assumed immediately.

Otherwise, when “fast back” is selected, the Failsafe Level Advance is restricted, however the advance to the new material level (when a valid measurement is made) is immediate.

Values:

- 1 = restricted
- 2 = immediate
- 3 = fast back

Relay Parameters (P100 to P104, P110 to P113, P129)

If relays are to be used, alter the following parameters as required.

Note:

Otherwise, proceed to mA OUTPUT PARAMETERS.

Relays may be programmed as Standard Alarms or for Custom Relay operation.

For **Standard Alarms** (relays operate based on sludge level), select the Relay Set Up (P100) desired and alter the Standard Alarm (P101 to P104) parameters as required, before proceeding to Relay Failsafe (P129).

For Custom Relay operation, select the Relay Set Up (P100) which most closely matches your requirements, and alter the Custom Relay Parameters (P110 to P113) as required, before proceeding to Relay Failsafe.

P100 (G) Relay Set Up

This parameter presets relays to operate as Standard Alarms. The **Relay Allocation** (relay / point number association) and Standard Alarm (P101 to P104) parameters are also preset.

Relay status during a measurement difficulty is dependent upon Failsafe programming. See Failsafe Parameters (P070 to P072) and Relay Failsafe (P129). As preset, relay status is "held" at "last known" sludge levels until a valid measurement is made.

Option	Relay #	Point #	Standard Alarm (as % of Span, P007)
1	1	1	(High Alarm) P101 = 80.00%
	2	1	(Low Alarm) P102 = 20.00%
	3	2	(High Alarm) P101 = 80.00%
	4	2	(Low Alarm) P102 = 20.00%
2	1	1	(High Alarm) P101 = 80.00%
	2	1	(High High Alarm) P103 = 90.00%
	3	2	(High Alarm) P101 = 80.00%
	4	2	(High High Alarm) P104 = 10.00%
3	1	1	(Low Alarm) P102 = 20.00%
	2	1	(Low Low Alarm) P104 = 10.00%
	3	2	(Low Alarm) P102 = 20.00%
	4	2	(Low Low Alarm) P104 = 10.00%
4	1	1	(High Alarm) P101 = 80.00%
	2	1	(Low Alarm) P102 = 20.00%
	3	1	(High High Alarm) P103 = 90.00%
	4	1	(Low Low Alarm) P104 = 10.00%

Independently altered Standard Alarms (P101 to P104), Relay Allocation (P110), Relay Function (P111) and Relay A/B Setpoints (P112/P113) are automatically reset when a Relay Set Up value is altered.

Values:

- 1 = Set Up 1
- 2 = Set Up 2
- 3 = Set Up 3
- 4 = Set Up 4

Standard Alarms (P101 to P104)

In the RUN mode, when the sludge level...

- rises to a High or High High Alarm value, the associated Alarm and Relay Status indicators are displayed and the allocated relay(s) de-energize.
- falls 5% of Span (P007) below the High or High High Alarm value, the associated Alarm and Relay Status indicators extinguish, and the allocated relay(s) energize.
- falls below the Low or Low Low Alarm value, the associated Alarm and Relay Status indicators are displayed and the allocated relay(s) de-energize.
- rises 5% of Span (P007) above the Low and Low Low Alarm value, the associated Alarm and Relay Status indicators extinguish, and the allocated relay(s) energize.

Note:

Enter all Standard Alarm material level values in Units (P005) or percent of Span (P007) as referenced to Empty (P006).

To display the current value (or enter a new value) in percent of Span, press  as required to display the % symbol.

P101 High Alarm

Enter the High Alarm sludge level for the Point Number displayed.

Values: -999 to 9999 (preset to 80.00% of Span or equivalent Units)

P102 Low Alarm

Enter the Low Alarm sludge level for the Point Number displayed.

Values: -999 to 9999 (preset to 20.00% of Span or equivalent Units)

P103 High High Alarm

Enter the High High Alarm sludge level for the Point Number displayed, (Relay Set Up 2 or 4 only).

Values: -999 to 9999 (preset to 90.00% of Span or equivalent Units)

P104 Low Low Alarm

Enter the Low Low Alarm sludge level for the Point Number displayed, (Relay Set Up 3 or 4 only).

Values: -999 to 9999 (preset to 10.00% of Span or equivalent Units)

Notes:

- “OFF” is displayed if the Relay Set Up (P100) selected does not use the Alarm parameter accessed.
- “Ch” is displayed if a Custom Relay Parameter was previously operator altered. Use Relay A/B Setpoints (P112/P113) instead.

If Custom Relay operation is not required, proceed to Relay Failsafe (P129).

Custom Relays (P110 to P113)

P110 Relay Allocation

Use this feature to alter the Relay Set Up (P100) relay/ point number association, to have any relay operate based upon the operation of any Point Number.

When accessed, the Relay symbol is displayed in the Point Type field and the Relay Number (corresponding to the DPS 300 terminals) is displayed in the Point Number field.

e.g. To allocate Relay 3 to Point 1, with Relay Number 3 displayed, enter 1.

If a relay is allocated to more than one Point Number, when any Point Number (in the allocation range) is in alarm, the relay de-energizes.

Note:

When Relay Allocation is altered, affected alarm (P101 to P104) parameters display “ch” (changed), when accessed. Use the Relay A/B Setpoint (P112/P113) instead.

Values:

- x (x = single Point Number (1-3) to be allocated to the displayed Relay Number)
- x.y (x = first Point Number (1-3), y = last Point Number (1-3), in the range)

P111 Relay Function

Use this feature if alternate relay function, designation, or operation is required.

When accessed, the Parameter Type display changes to the Relay symbol and the Point Number display changes to the Relay Number (corresponding to the DPS 300 terminals).

To enter a Relay Designation...

1. Press  to display the Auxiliary Function symbol,
2. Press  or  to scroll access the desired relay designation and...
3. Press .

FUNCTION	DESIGNATION	OPERATION
Level	LL, L, H, or HH	Similar to Standard Alarms but with Relay A/B Setpoints
In Bounds	b1 or b2 *	Alarms when level is between the Relay A/B Setpoints
Out of Bounds	b1 or b2 *	Alarms when level is not between the Relay A/B Setpoints
Rate	r1 or r2 *	Level rate of change alarm with Relay A/B Setpoints
Temperature	Not applicable	Alarm is activated by independent Relay A/B Setpoints
LOE	Not applicable	Relay de-energizes in the event of Failsafe timer (P700) expiry
Cable fault	Not applicable	Relay de-energizes under transducer short or opened condition
Pump	Not applicable	With independent Relay A/B Setpoints
Timed	Not applicable	Based on Relay "duration/interval" Setpoints (P114/115)
* The Relay Designation is not displayed but is included in the BIC-II (if used) data message.		

Note:

When the Relay Function is altered, affected Alarm Parameters (P101 to P104) display "ch" (changed) when accessed. Use the Relay A/B Setpoints (P112/P113) instead.

To reset the Relay Function to use Standard Alarms, enter the desired Relay Set Up (P100).

Values:

- 0 = off (relay always de-energized)
- 1 = level alarm (preset)
- 2 = in bounds alarm
- 3 = out of bounds alarm
- 4 = rate of change alarm
- 5 = temperature alarm
- 6 = LOE alarm (Relay A/B Setpoints are not applicable)
- 7 = transducer cable fault alarm
- 50 = pump control (non-sequenced)
- 60 = timed activation based on "duration" and "interval" setpoints

Independent Relay Setpoints

Relay A and B Setpoint values set the critical points (based on the Relay Function) where, in the Run mode ...

1. Relay status indicators are switched "ON" and "OFF"
2. Alarm Indicators (if programmed) are switched "ON" or "OFF"
3. Relays are "energized" and "de-energized"

For most Relay Functions, setpoint values represent sludge levels, entered in Units (P005) or percent of Span (P007) as referenced to Empty (P006). Temperature alarm values are entered in degrees Celsius (°C).

Note:

Rate alarms are entered in Units / minute or percent of Span per minute. A positive value is entered for a filling rate alarm; negative for emptying.

RELAY FUNCTION	SETPOINTS *		ACTION			WHEN
	A	B	Status	Alarm	Relay	
Level H or HH	85%	70%	On	On	de-energizes	Level rises to 85%
			Off	Off	energizes	Level falls to 70%
Level L or LL	15%	30%	On	On	de-energizes	Level falls to 15%
			Off	Off	energizes	Level rises to 30%
In bounds ▲	80%	50%	On	On	de-energizes	Level falls to 78%
			Off	Off	energizes	Level rises to 82%
			On	On	de-energizes	Level rises to 52%
			Off	Off	energizes	Level falls to 48%
Out of bounds ▲	80%	50%	Off	Off	energizes	Level falls to 78%
			On	On	de-energizes	Level rises to 82%
			Off	Off	energizes	Level rises to 52%
			On	On	de-energizes	Level falls to 48%
Rate of change	+10%	+5%	Off	Off	de-energizes	Fill rate increases to 10%/min
			On	On	energizes	Fill rate decreases to 5%/min
	-10%	-5%	Off	Off	de-energizes	Empty rate increases to 10%/min
			On	On	energizes	Empty rate decreases to 5%/min
Temperature	60	55	On	On	de-energizes	Temperature rises to 60°C
			Off	Off	energizes	Temperature falls to 55°C
	-30	-25	On	On	de-energizes	Temperature falls to -30°C
			Off	Off	energizes	Temperature rises to -25°C
Pump	80%	20%	On	On	energizes	Start pump down on level at 80%
			Off	Off	de-energizes	Stop pump down on level at 20%
	20%	80%	On	On	energizes	Start pump up on level at 20%
			Off	Off	de-energizes	Stop pump up on level at 80%
* Values shown are for illustration purposes only. Enter values which apply to your particular installation.						
▲ 2% factory set deadband, adjustable via P116						

P112 Relay A Setpoint

Enter the critical point for the desired action to occur (based on the Relay Function selected).

Values: -999 to 9999

Note:

Relay A/B Setpoint values cannot be exactly equal.

P113 Relay B Setpoint

Enter the critical point for the desired action to occur (based on the Relay Function selected).

Values: -999 to 9999

P114 Relay “duration” Setpoint

The length of time in minutes the relay is to be energized.

Enter the length of time (in minutes) for the relay to remain energized.

Values: 0.000 to 9999 (minutes)

Preset: 0.000 min

Note:

This value must be less than the “interval” setpoint or the relay will never reset.

P115 Relay “interval” Setpoint

The length of time in hours between timed starts.

Enter the length of time (in hours) between relay activation.

Values: 0.000 to 9999 (hours)

Preset: 0.000 hrs

Note:

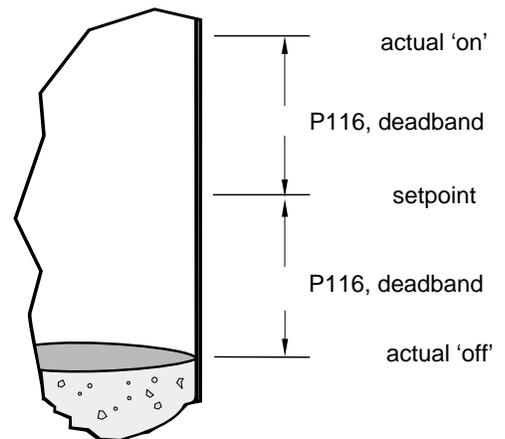
This value must be greater than the “duration” setpoint or the relay will never reset.

P116 Bound Alarm Deadband

For ‘in bounds’ and ‘out of bounds’ Relay Functions (P111 = 2 and 3 respectively), a dead band prevents relay chatter due to material level fluctuations at the upper or lower setpoint.

Enter dead band in % of span or units of P005. (Factory set at 2%).

The dead band value is applied above and below the upper and lower bound setpoints.



e.g. in bounds, lower setpoint

P129 Relay Failsafe

Use this feature for relay failsafe operation independent from the Failsafe Material Level (P070).

When accessed, the Parameter Type display changes to the Relay symbol and the Point Number display changes to the Relay Number (corresponding to the DPS 300 terminals)

Select:

- “OFF” to have the relay respond to the Failsafe Material Level (P071).
- “HOLd” to hold the relay at the “last known” state until normal operation resumes,
- “dE” to have the relay de-energize immediately, or
- “En” to have the relay energize immediately,

When the Relay Function (P111) is set for:

- “alarm” (any option other than “pump”), this feature is preset to “OFF”.
- “pump”, this feature is preset to “dE”.

To select an independent Relay Failsafe option value:

1. Press  to display to the Auxiliary Function symbol,
2. Press  or , to scroll access the failsafe options.
3. Press , with the desired option displayed.

Values:

“OFF”
“HOLd”
“dE”
“En”

mA Output Parameters (P200 to P203, P210 to P215, P219)

If DPS 300 mA outputs are to be used, alter the following parameters as required. Otherwise, proceed to OPERATION.

When an mA Output Parameter is accessed, the mA symbol is displayed in the Point Type field and the mA output number (corresponding to the DPS 300 terminals) is displayed in the Point Number field.

P200 mA Range

Enter the desired range of the mA output displayed.

Value:

0 = OFF
1 = 0 to 20 mA
2 = 4 to 20 mA (preset)
3 = 20 to 0 mA
4 = 20 to 4 mA

P201 mA Function

Use this feature to alter the automatic mA output/measurement relationship, if desired.

The mA Function automatically corresponds to “level”, “space”, or “distance” based upon Operation (P001). If a Tank Shape (P050) is programmed, the mA Function automatically corresponds to volume (unless the mA Allocation has been altered).

Values:

1 = level
2 = space
3 = distance
4 = volume

P202 mA Allocation

Use this feature if Point Number to mA output allocation alteration is required. Enter the Point Number(s) the mA output displayed, is to be based upon.

As preset, mA outputs 1 and 2 are allocated to Point Numbers 1 and 2 respectively.

If Point 1 and 2 are allocated to a single mA output, the output value represents the Dual Point Average. (The Quick Start Parameter values should be identical for both points).

When both mA outputs are allocated to the same Point Number, the mA Setpoint parameters may be used to establish two separate or overlapping mA output spans. However, the mA Value / Transducer (P203) corresponds to mA Output 1 only.

Values:

1 = Point 1

2 = Point 2

1.2 = Dual Point Average

P203 (V) mA Value / Transducer

View the current value of the mA output associated with the Point Number displayed.

This is the Auxiliary Reading displayed when [mA] is pressed in the RUN mode.

If both mA outputs are allocated to the same Point Number, the value of mA Output 1 is displayed.

Values: 0.000 to 22.00

P210 0/4 mA Setpoint

Use this feature to reference the minimum mA output to any point in the measurement range.

Enter the material level (referenced to Empty, P006) corresponding to the minimum mA output.

This feature is preset to 0% or 100% of Span (P007) as determined by Operation (P001).

Typically, this value is entered in Units (P005) or percent of Span (P007). If mA Function is set for "volume", enter the value in the Max Volume (P051) units or in percent of Max Volume.

Values: -999 to 9999

P211 20 mA Setpoint

Use this feature to reference the 20 mA output to any point in the measurement range.

Enter the sludge level (referenced to Empty, P006) corresponding to 20 mA.

This feature is preset to 0% or 100% of Span (P007) as determined by Operation (P001).

Typically, the value is entered in Units (P005) or percent of Span (P007). If mA Function is set for "volume", enter the value in the Max Volume (P051) units or as a percent of Max Volume.

Values: -999 to 9999

P212 mA Min Limit

Use this feature to prevent the mA output from falling below the minimum acceptable mA input value (preset to 3.800 mA) of the device connected.

Values: 0.000 to 22.00

P213 mA Max Limit

Use this feature to prevent the mA output from exceeding the maximum acceptable mA input value (preset to 20.20 mA) of the device connected.

Values: 0.000 to 22.00

P214 4 mA Trim

Use this feature (in combination with 20 mA Trim) if the device connected to the mA output displayed is out of calibration, yet device recalibration is impractical.

Adjust this value (preset to 0.000) as required to make the device connected indicate 4.000 mA when this parameter is accessed.

Values: -1.00 to 1.000

P215 20 mA Trim

Use this feature (in combination with 4 mA Trim) if the device connected to the mA output displayed is out of calibration, yet device recalibration is impractical.

Adjust this value (preset to 0.000) as required to make the device connected indicate 20.00 mA when this parameter is accessed.

Values: -1.00 to 1.000

P219 mA Failsafe

Use this feature if mA output failsafe operation, independent from the Failsafe Material Level (P071) is desired.

To select an independent mA Failsafe option value:

1. Press  to display the Auxiliary Function symbol,
2. Press  or , to scroll access the failsafe options.
3. Press  with the desired option displayed.

Values:

- “OFF” to have the mA output respond to the Failsafe Material Level (P071).
- “HOLd” to hold the output at the “last known” value until normal operation resumes.
- “LOW” to produce the “Empty” mA output immediately on Failsafe Timer (P070) expiry.
- “HIGH” to produce the “Span” mA output immediately on Failsafe Timer (P070) expiry.

Alternatively, to produce an immediate mA output at a specific value, enter the value required.

Values: 0.000 to 22.00

ENHANCEMENT PARAMETERS

This section identifies all DPS 300 operator programmable features designed for altering operation to suit individual operator preferences or overcome measurement difficulties.

Typically, these parameters are only altered as directed by the TROUBLESHOOTING GUIDE. If RUN mode performance requires improvement, access and alter the following parameters as required.

Note:

Otherwise, proceed to OPERATION.

PARAMETER CATEGORY	PURPOSE	PAGE
Data Logging	to view previous maximum Temperature records	69
Profile Records	intended for use by Milltronics Service Personnel	70
Installation Records	to identify length of service and power failure occurrence	73
Range Calibration	to compensate for measurement offset and/or sound velocity	73
Temperature Compensation	to override automatic temperature compensation features	75
Rate	to adjust the rate of response to change in the sludge level	76
Measurement Verification	to adjust the rate of response to change in the sludge level	78
Display Parameters	to override the preset display operating characteristics	79
Echo Processing	to troubleshoot false echo detection	82
Advanced Echo Processing	intended for use by Milltronics Service personnel	84
Test Parameters	intended for use by Milltronics Service personnel	91
Measurement Parameters	to verify Application Parameter programming	93
Master Reset	to reset Parameter Values to factory settings	95

Note:

When an Enhancement Parameter is altered, return to the RUN mode to verify the performance desired is achieved, before making any other changes.

Data Logging Parameters (P300 and P302)

View the maximum Temperature recorded in the RUN mode.

P300 (V) Temperature, Transducer Max

Use this feature to view the highest temperature recorded (in ° C) by the XCT-12 transducer.

Values: -50 to 150

P302 (V) Temperature, Sensor Max

Use this feature to view the highest temperature recorded (in ° C) by the TS-3 temperature sensor, if used.

When accessed, the TS-3 symbol is displayed in the Point Type field and the TS-3 Number is displayed in the Point Number field.

Values: -50 to 150

Profile Records (P330 to P337)

The following parameters are for authorized Milltronics service personnel or Instrumentation Technicians familiar with Milltronics echo processing techniques.

Use these features to record and save a total of up to 10 Echo profiles, initiated manually (P330), or automatically (P331 et al). See Scope displays (P810) for echo profile viewing hardware / software requirements.

If 10 Echo Profiles are already saved, addresses 1 through 10 are filled, the oldest automatically initiated record is overwritten. Manually initiated records are not automatically overwritten. All records are automatically deleted in the event of a power interruption.

When a record is displayed, results are based on current programming (which may have been altered since the record was saved). This permits the effect on the echo profile to be observed when changing an echo parameter.

P330 Profile Record

In addition to serving as a library for profile records, this parameter provides two functions:

- manually records and saves echo profiles
- displays an echo profile, recorded manually or automatically, e.g. via an oscilloscope.

To select a record address:



Press  until address index is enabled.

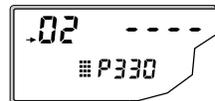
e.g. initial parameter display



Pressing   selects the desired address, 1 to 10, and displays the associated parameter

Value:

- ` - - - ' = no record
- ` x# ' = record



Where:

- X = A, automatically initiated
- = U, manually initiated
- # = transducer number

e.g. address 2 selected, no record saved

To manually record a profile:

Press , and transducer* fires, and echo profile is recorded into the internal scope buffer for display.

To save a manual record:

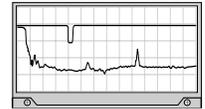
Pressing  copies the echo profile record in the scope buffer and saves it in the selected address in the record library. The parameter value field displays the new record ordinates.



e.g. manually initiated record from transducer 1 saved in address 2

To display a record

Pressing   copies the echo profile record in the selected address to the scope buffer, for display.



e.g. oscilloscope displays record in address 3

To delete a record:

Pressing   deletes the echo profile record in the selected address. Parameter value returns to `----`.



e.g. record deleted, address 3 clear

* Access the Scope Displays (P810) parameter to select the Transducer.

P331 (G) Auto Record Enable

Use this feature (if desired) to enable/disable the Auto Profile Record function.

Values:

- 0 = off
- 1 = on

P 332 (G) Auto Record Transducer

Use this feature (if desired) to specify the Transducer Point Number for which Auto Profile Records are saved.

This Feature is preset to Point Number 1.

Values:

- 0 = any Transducer
- 1 = Transducer 1 (preset)
- 2 = Transducer 2

P333 (G) Auto Record Interval

Enter the time (in minutes) to elapse after an Auto Profile Record is saved before another Auto Profile Record can be saved (subject to all other restrictions).

Values: 0.000 to 9999 (preset to 120 minutes)

Auto Record A/B Setpoint

Use Auto Record A Setpoint (P334) and Auto Record B Setpoint (P335) to define the boundaries within which the level must be, for the resultant Echo Profile to be considered for an Auto Profile Record.

If “ - - - ” is displayed for either P334 or P335, Auto Profile Records are saved regardless of current level (subject to all other restrictions).

Enter the level value in Units (P005) or percent of Span (P007) as referenced to Empty (P006).

(Ensure the % Symbol is displayed before attempting to enter a value in percent, see PROGRAMMING / Keypad).

P334 (G) Auto Record A Setpoint

Enter the critical level which, in conjunction with Auto Record B Setpoint, defines the boundaries for Auto Profile Records to be stored.

Values: -999 to 9999

P335 (G) Auto Record B Setpoint

Enter the critical level which, in conjunction with Auto Record A Setpoint, defines the boundaries for Auto Profile Records to be stored.

Values: -999 to 9999

P336 (G) Auto Record Filling/Emptying

Use this feature to restrict Auto Profile Records from being saved unless the level is rising, falling or either.

If the level changes at a rate in excess of the corresponding Filling/ Emptying Indicator (P702 / P703) values, the Echo Profile is saved subject to this and other Auto Profile Record restrictions).

Values:

0 = Auto Profile Record on filling or emptying (preset).

1 = Auto Profile Record on filling only.

2 = Auto Profile Record on emptying only.

P337 (G) Auto Record LOE Time

Use this feature to restrict Auto Profile Records from being saved unless an extended loss of echo (LOE) condition occurs.

If the LOE condition exceeds the period entered (in seconds) the Echo Profile is saved subject to this and other Auto Profile Record restrictions.

When set for “0” (preset), LOE is not required for an Auto Profile Record to be saved.

Values: 0.0 to 9999

Installation Records (P340 to P342)

P340 (V) Date of Manufacture

View the date of manufacture of this DPS.

Values: YY:MM:DD

P341 (V) Run Time

View the accumulated number of days this DPS has been operating, since the Date of Manufacture.

Values: 0.000 to 9999

P342 (V) Start Ups

View the accumulated number of times power has been applied to the DPS (following a power interruption), since the Date of Manufacture (P340).

Values: 1 to 9999

Range Calibration Parameters (P650 to P654)

P650 Offset Calibration

Use this feature if the Empty (P006) value was estimated or if the reported sludge level is consistently high or low by a fixed amount (e.g. 2 cm).

Before using this feature, verify the:

- Empty (P006) value (as measured or estimated) was entered correctly.
- Temperature (P664) is correct.
- Offset Reading (P062) value (if used) was entered correctly.

To perform an Offset Calibration:

With the material at a **high** steady level...

1. Press  to display the calculated distance*.
2. Repeat step 1 at least 5 times to overcome Echo Lock (P721) and verify repeatability.
3. Measure the actual distance* (e.g. with a tape measure).
4. Enter the actual value. (The Offset Correction amount is stored in P652).

Values: -999 to 9999

P651 Sound Velocity Calibration

To perform a Sound Velocity Calibration:

With the sludge at a **low** level, and unagitated...

1. Press  to display the calculated distance*.
2. Repeat step 2 at least 5 times to overcome Echo Lock (P721) and verify repeatability.
3. Measure the actual distance* (e.g. with a Sludge Judge).
4. Enter the actual value. (Velocity parameters P653 and P654 are adjusted accordingly).

Values: -999 to 9999

* When Operation (P001) for the Point Number displayed is set for:

- “level”, the distance is from Empty (P006) to the sludge surface.
- “space”, the distance is from Span (P007) to the sludge surface.
- “distance”, the distance is from the transducer face to the sludge surface.

P652 Offset Correction

View the amount of offset applied to the Reading.

This value is automatically adjusted when an Offset Calibration is performed.

Alternatively, if the amount of Offset Correction required is known (and performing an Offset Calibration is not desired), enter the amount to be added to the Reading before display.

Values: -999 to 9999

P653 Velocity

View the actual sound velocity in water at the current temperature (P664).

When a Sound Velocity Calibration is performed, this value is automatically adjusted. The change in the sound velocity reflects the characteristics of the prevailing conditions; i.e. wastewater temperature and turbidity.

Alternatively, if the current sound velocity is known, enter the current sound velocity. (Refer to TECHNICAL REFERENCE / Sound Velocity).

The units used are m/s if P005 = 1, 2, or 3 (ft/s if P005 = 4 or 5).

Values: 50.00 to 2000 m/s (164.0 to 6562 ft/s)

P654 Velocity at 20°C

View the value of the sound velocity in water normalized to 20°C (68°F) used to calculate Sound Velocity (P653), using Temperature (P664) based on the sound velocity vs. temperature characteristics of water.

After a Sound Velocity Calibration, this value represents the actual sound.

The velocity of sound in water is typically 1483 m/s (4864 ft/s).

The units used are m/s if P005 = 1, 2, or 3 (or ft/s if P005 = 4 or 5).

Values: 50.00 to 2000 m/s (164.0 to 6562 ft/s)

Temperature Compensation Parameters (P660 to P664)

P660 Temp Source

This feature is preset to "AUTO". On scanning a transducer, the DPS 300 scans the TS-3 temperature sensor assigned to the transducer. If a TS-3 sensor is not connected, the temperature measurement from the transducer is used.

If the wastewater temperature between the transducer and the sludge varies, connect a TS-3 Temperature Sensor between these two points and select "average".

Values:

- 1 = AUTO
- 2 = Temp Fixed
- 3 = XCT-12 Transducer
- 4 = TS-3 Temperature Sensor
- 5 = Average
- 6 = TS-3 SENSOR # 1

P661 Temp Fixed

Use this feature if a temperature sensing device is not used.

Enter the temperature (in °C) of the clarifier wastewater. If the temperature varies with distance from the transducer, enter the average temperature. This value is preset to 20.00°C.

Values: -50 to 150

P662 Temperature Sensor Allocation

As preset, TS-3 number 1 and 2 are allocated to Point Number 1 and 2 respectively.

To alter this allocation, enter the TS-3 number which is used for the distance calculation of the Point Number displayed.

When both TS-3 temperature sensors are allocated to one Point Number, the temperature measurements from each sensor are averaged for that clarifier.

Values:

- 1 = TS-3 number 1
- 2 = TS-3 number 2
- 1.2 = TS-3 number 1 and 2 average

P663 Temperature Transducer Allocation

As preset, the temperature sensor inside of transducer number 1 and 2 are allocated to Point Numbers 1 and 2 respectively. So, the temperature sensor of transducer 1 is allocated to Point Number 1 and 2 is allocated to 2.

To alter this allocation, enter the transducer number whose temperature measurement will be used for the distance calculation of the Point Number displayed.

When both transducers are allocated to one Point Number, the temperature measurements from each transducer are averaged for that clarifier.

Values:

1 = Transducer number 1

2 = Transducer number 2

1.2 = Transducer number 1 and 2 average

P664 (V) Temperature

View the current temperature in °C.

This is the value displayed when  is pressed in the RUN mode.

If Temp Source (P660) is set to any value other than Fixed Temp, the value displayed is the temperature measured. If Temp Source is set to Fixed Temp, the P661 value is displayed.

Values: -50 to 150

Rate Parameters (P700 to P707)

P700 Max Fill Rate

Adjust the DPS 300 response to increases in the actual sludge level (or advance to a higher Failsafe Material Level, P071).

Note:

Enter a value slightly greater than the maximum clarifier filling rate.

The value is in Units (P005) or % of Span (P007) per minute.

Values: 0.000 to 9999

P701 Max Empty Rate

Adjust the DPS 300 response to decreases in the actual sludge level (or advance to a lower Failsafe Material Level, P071).

Note:

Enter a value slightly greater than the maximum clarifier emptying rate.

The value is in Units (P005) or % of Span (P007) per minute.

Values: 0.000 to 9999

P702 Filling Indicator

Enter the fill rate required to activate the LCD Material Filling indicator.

The value is in Units (P005) or % of Span (P007) per minute is automatically set to 10% of the Max Fill Rate (P700).

Values: -999 to 9999

P703 Emptying Indicator

Enter the empty rate required to activate the LCD Material Emptying indicator.

The value is in Units (P005) or % of Span (P007) per minute is automatically set to 10% of the Max Empty Rate (P701).

Values: -999 to 9999

P704 Rate Filter

Use this feature to avoid Rate Value (P707) fluctuations due to an unstable sludge surface.

If the sludge surface rises and falls quickly, the filling or emptying indicator may toggle unnecessarily, and may cause relay chatter if relays are controlled by rate. This feature can be used to average those changes.

This value automatically alters the Rate Update Time (P705) and / or Rate Update Distance (P706). Alternatively, these parameter values may be altered independently.

Enter the time period/distance the Rate Value is averaged before display update.

Values:

- 0 = rate display not required
- 1 = continuously averaged and updated
- 2 = 1 minute or 50 mm (2 in)
- 3 = 5 minutes or 100 mm (3.9 in)
- 4 = 10 minutes or 300 mm (11.8 in)
- 5 = 10 minutes or 1000 mm (39.4 in)

P705 Rate Update Time

Enter the time period (in seconds) over which the material level rate of change is averaged before Rate Value update.

Values: 0.000 to 9999

P706 Rate Update Distance

Enter the sludge level change (in meters) to initiate a Rate Value update.

Values: 0.000 to 9999

P707 (V) Rate Value

View the rate of sludge level change (in Units (P005) or % of Span (P007) per minute).

(A negative rate indicates the clarifier is emptying).

This is the value displayed when is pressed in the RUN mode.

Values: 0.000 to 9999

Measurement Verification Parameters (P710 to P713)

P710 Fuzz Filter

Use this feature to stabilize the reported sludge level, due to level fluctuations (such as a rippling surface), within the Echo Lock Window (P713).

The value is in % of Span. The higher the value entered, the greater the fluctuation stabilized. (0 = off)

Values: 0 to 100

P711 Echo Lock

Use this feature to determine how quickly the DPS 300 locks onto a new echo.

The value is automatically altered when Material (P002) is altered.

When set for "skimmer" or "material agitator", a new measurement outside of the Echo Lock Window (P713) must meet the sampling criterion (P712).

For "total lock", Echo Lock Window (P713) is preset to "0". The DPS 300 continuously searches for the best echo according to the algorithm chosen (P820). If the selected echo is within the window, the window is then centred about the echo. If not, the window widens with each successive shot until the selected echo is within the window. The window then returns to its normal width.

When Echo Lock is turned "off" the DPS 300 responds immediately to a new measurement as restricted by the Max Fill / Empty Rate (P700/P701), however measurement reliability is affected.

Values:

- 0 = off
- 1 = skimmer
- 2 = material agitator
- 3 = total lock

P712 Echo Lock Sampling

Use this parameter to specify the number of echos required to move the current level value outside of the Echo Lock Window.

The two values, represented as x.y are for echos above and below the current Echo Lock Window, respectively.

When P711 Echo Lock is set to “1, skimmer” or “2, material agitator” then echos detected outside of the Echo Lock Window are counted and a new level value is displayed only after the counted echos exceed the Echo Lock Sampling value.

<i>P711 value</i>	<i>P712 preset value</i>
1, skimmer	5:5
2, material agitator	5:2

e.g. : P711 = 2, material agitator

P712 = 5:2

A new reading will not be validated unless 5 consecutive measurements are higher or 2 consecutive measurements are lower than the current Echo Lock Window.

Values: x.y

x= # of `above' echoes

y = # of `below' echoes

Note:

Resetting P711 returns P712 to the respective preset values.

P713 Echo Lock Window

Use this feature to adjust the size of the Echo Lock Window (in ms).

The Echo Lock Window is a “time window” (in ms) placed on either side of the echo used to derive the Reading. When a new measurement falls within the window, the window is re-centred and the new Reading is calculated. Otherwise, the new measurement is verified by Echo Lock (P711) before the DPS 300 updates the reading.

When “0” is entered (preset), the window is automatically calculated based on the Max Fill / Empty Rate (P700 / P701).

Values: 0.000 to 9999

Display Parameters (P730 to P733, P740)

P730 (G) Auxiliary Reading

Use this feature to display operator selected Auxiliary Readings temporarily.

Select “OFF” to display Auxiliary Readings temporarily. Select “HOLd” to display Auxiliary Readings until another Auxiliary Reading is selected.

(See OPERATION Keypad for RUN mode Auxiliary Reading selection.)

To select the Auxiliary Reading operation desired.

1. Press  to display the Auxiliary Function symbol.
2. Press  or  to display the “OFF” or “HOLd” (preset) option as desired.
3. Press .

If desired, also enter the Parameter Number to default in the Auxiliary Reading display.

Values: 000 to 999

P731 (G) Auxiliary Reading Key

Use this feature to enable a specific Parameter Value to be monitored in the RUN mode.

Enter the Parameter Number whose value is to be displayed in the Auxiliary Reading field when  is pressed in the RUN mode.

(See OPERATION Keypad for RUN mode Auxiliary Reading selection.)

Values: 000 to 999 (preset to Material Measurement, P921)

P732 (G) Display Delay

Use this feature if the Point Number display scrolls too quickly in the RUN mode.

Enter the delay (in seconds) before the display advances to the next Point Number.

(Point Number display scrolling is independent from transducer scanning.)

Values: 0.5 to 10 (preset to 1.5 seconds)

P733 (G) Scroll Access

Use this feature to select the programming mode parameter scroll access option desired.

Select:

- “off” to scroll access all operator accessible parameters.
- “smart” to scroll access Quick Start, previously altered, and tagged parameters.
- “tagged” to scroll access operator tagged parameters only.

Any accessed parameter may be *tagged* or *untagged* by pressing  .

 is displayed when a previously tagged or altered parameter is accessed.

Values:

- 0 = off
- 1 = smart (preset)
- 2 = tagged

Peripheral Communication Support Parameters (P740 to P772)

P740 Peripheral Communications

Use this feature to select the DPS 300 to communication message format.

Select:

- “off” if the communication port is not used, to increase the DPS 300 processing speed.
- “normal” to have messages transmitted in a continuous string of characters. (Requires less DPS 300 processing time than formatted messages).
- “formatted” to have commas inserted between the message fields for easier message dissemination (when viewed on a monitor).

Note:

Refer to TECHNICAL REFERENCE Communication Support if a Peripheral Communication is required.

Values:

- 0 = off
- 1 = normal messages (preset)
- 2 = formatted messages

P748 RS485 Termination

Single point termination may be required to minimize transmission reflections, on long cable runs typical of 500m or more. Turn on the termination if required.

Values:

- 0 = off
- 1 = on

P749 Serial Bus Type (V)

Displays the type of communication bus the DPS 300 is currently set for. If there is no connection, the DPS 300 defaults to RS-485. If a bus type other than RS-485 is connected, the DPS 300 displays the type of bus it is, or is attempting to, communicate with.

Displays:

- 232 = RS-232
- 485 = RS-485 (default setting when nothing is connected)
- bPL = bipolar current loop
- rJ11 = for Milltronics use

P772 Baud Rate

The communication rate with the master device (i.e. Dolphin Plus on a PC).

This parameter specifies the rate of communication in Kbaud. Any value may be entered but only the values shown below are supported.

Note:

This parameter is not reset by P999.

Values:

- 4.8 = 4800
- 9.6 = 9600
- 19.2 = 19 200
- 38.4 = 38 400 (preset)

SmartLinx® Parameters (P790 to P792)

These parameters are specific to the SmartLinx® module installed. Refer to the module documentation for a list and description of the specific parameter requirements.

P790 Hardware Error

Use this feature to display the results of ongoing hardware tests within the communications circuitry. If any test does not meet the PASS requirements, communication halts and tests are repeated until PASS requirements are met. Communications then resumes.

Displays:

PASS: no problem
FAIL: faulty SmartLinx module or DPS 300
ERR1: unknown protocol, upgrade the DPS 300 software

P791 Bus Error

This feature indicates if an error condition is occurring on the bus.

Displays:

0 = no error
Ø = error code, refer to the SmartLinx module documentation for explanation of the error code

P792 Bus Error Count

This register increments by 1 each time a bus error (P752) is reported. The register is factory set at 0 and can be preset to any value. The register is reset to 0 by the master reset (P999).

Echo Processing Parameters (P800 to P807)

P800 Near Blanking

Use this feature if the material level is incorrectly reported to be near the transducer face.

Near Blanking may be extended to overcome measurement difficulties which cannot otherwise be corrected by transducer location, mounting, or aiming modification. Extend Near Blanking to 150 mm (6 in) beyond the incorrect distance measured.

This parameter is preset to 1.000 m or equivalent Units (P005) regardless of Empty (P006).

Note:

Ensure the Near Blanking distance is less than Empty (P006) - Span (P007).

To reset the automatic Near Blanking value press  .

Values: 0.000 to 9999 (preset 1.00m)

P801 Range Extension

Use this feature if an incorrect level is reported (when material level is lower than Empty, P006).

Range Extension is the distance in Units (P005) or % of Span (P007) beyond Empty, which is still ultrasonically measurable.

If Empty is substantially higher than the actual clarifier bottom, increase Range Extension such that Empty plus Range Extension is greater than the transducer to clarifier bottom distance.

Values: 0.000 to 9999

P804 Confidence Threshold

Use this feature when an incorrect material level is reported.

The Confidence Thresholds are preset to 10 and 5 respectively. If the Echo Confidence (P805) of a particular echo exceeds the Confidence Threshold, that echo is considered for evaluation by Sonic Intelligence™.

Values: 0:y y = 0 to 99

P805 (V) Echo Confidence

Use this feature to monitor the effect of transducer aiming, location, and mechanical transducer / mounting isolation.

This is the value displayed when  is pressed for 4 seconds in the RUN mode.

Echo Confidence is displayed as:

“E” is displayed if the transducer cable is open or short circuited.

Values: 0:y y = 0 to 99

P806 (V) Echo Strength

Use this feature to view the strength (in dB above 1 μ V rms) of the echo selected to base the distance calculation upon.

Values: 0 to 99

P807 (V) Noise

Observe the average and peak ambient noise (in dB above 1 μ V rms) being processed.

The noise level is a combination of transient acoustic noise and electrical noise (induced into the transducer cable or receiving circuitry itself).

Values: x.y x = average (-99 to 99), y = peak (-99 to 99)

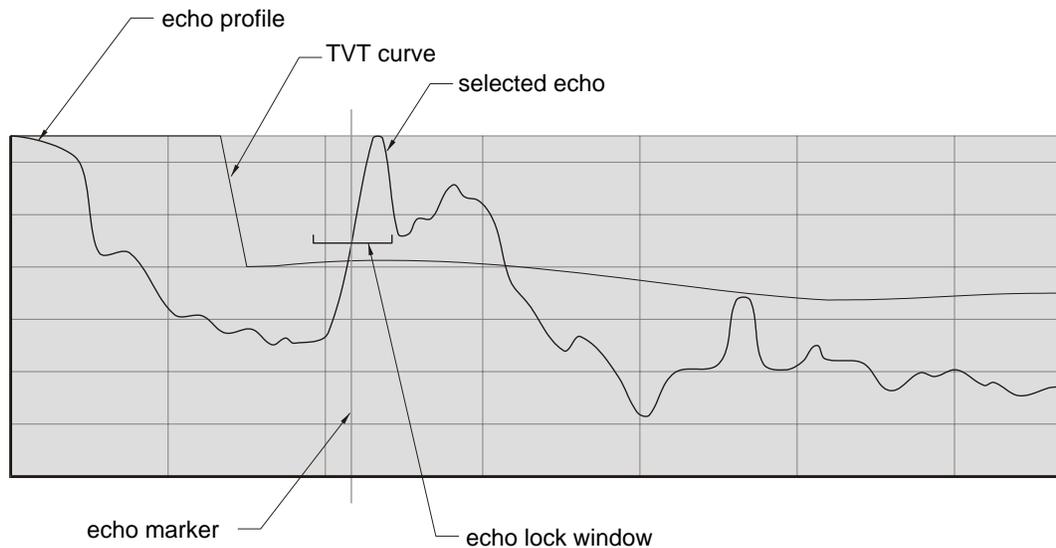
Advanced Echo Processing (P810 to P853)

Note:

The following Echo Processing parameters are intended for use by authorized Milltronics Service personnel or Industrial Instrumentation Technicians familiar with Milltronics ultrasonic echo processing techniques.

Anatomy of an Echo Profile

The relevant parts of an echo profile are listed here. These are visible in either Dolphin Plus or an oscilloscope.



P810 Scope Displays

Use this feature to monitor the results of Echo Processing parameter alterations.

Connect an oscilloscope to Display Board TP4, TP5, and TP6 (GND, SCOPE and SYNC).

Observe any combination of the following Scope Displays:



To select the desired Scope Display...

1. Press  to display the Auxiliary Function symbol,
2. Press  or  to scroll access the desired Reading display symbols.
3. Press  to select the displayed symbols.

Alternatively, a 4 digit binary value may be entered, where a “0” turns the associated signal display “off”, and a “1” turns the associated display “on”.

e.g. 1110 = PCn_ = Echo Profile, TVT Curve, and Echo Marker displays on.

See TECHNICAL REFERENCE / Echo Processing for more Scope Display illustrations.

Use the Scope Displays after pressing  (in the program mode) to observe the result of Echo Processing parameter alterations. (Take several measurements to verify measurement repeatability and overcome Echo Lock (P711) restrictions).

As preset, all displays are off.

P815 (V) Echo Time

Observe the time (in ms) between the transmit pulse and the processed echo, including delays such as filtering and rate limit.

P816 (V) Echo Time Raw

Observe the time of flight (in ms) between the transmit pulse and the raw echo, i.e. before processing.

Values: 0.000 to 9999

When a Profile Pointer Parameter is accessed, the Echo Lock Window scope display changes to a Profile Pointer display. The Profile Pointer may be moved to a number of points on the Echo Profile, to gain specific information dependent upon the Profile Pointer Parameter used.

To move the Profile Pointer to a specific point, enter the desired value. The Profile Pointer will move to the nearest acceptable Echo Profile point. The Profile Pointer is preset to “0”.

Alternatively, to scroll the Profile Pointer along the Echo Profile...

1. Press  to display the Auxiliary Function symbol,
2. Press  or  to move the Profile Pointer to the left or right respectively.

When the Profile Pointer Parameters are exited and  is pressed or the RUN mode is entered, the Profile Pointer display automatically changes back to the Echo Lock Window display.

P817 (V) Profile Pointer Time

Observe the time (in ms) between the transmit pulse and the Profile Pointer.

Values: 0.000 to 9999

P818 (V) Profile Pointer Distance

Observe the distance (in P005 Units) between the transducer face and the Profile Pointer.

Values: 0.000 to 9999

P819 (V) Profile Pointer Amplitude

Observe the amplitude (in dB above 1 μ V rms) of the Echo Profile at the Profile Pointer position.

Values: 0 to 99

P820 Algorithm

Use this feature to select the *Algorithm(s)* (mathematical operations) on which the Sonic Intelligence™ echo selection is based.

This value is automatically altered by Material (P002).

If the wrong echo is processed, select an alternate algorithm, while observing the resultant echo processing displays.

To select an Algorithm...

1. Press  to display the Auxiliary Function symbol,
2. Press  or  to display the desired Reading display symbol(s),
3. Press  (when the desired Algorithm is displayed)

Algorithms are characterized by a combination of echo characteristics:

area = echo with most area above the TVT
largest = echo with the largest amplitude above the TVT
first = first echo above the TVT to be received
last = last echo above the TVT to be received

Values:

ALF = Area, Largest, and First average.
A = Area only.
L = Largest only
F = First only
AL = Area and Largest average
AF = Area and First average
LF = Largest and First average
bLF = Largest or First
bL = Largest only
bF = First only
LAST = last only (first echo from empty)

P821 Spike Filter

Activate the Spike Filter if interference spikes are observed on the long shot Echo Profile display.

Values:

0 = off

1 = on (preset)

P822 Narrow Echo Filter

Use this feature to remove narrow echoes from profile.

Enter the width of false echoes (in ms), to be removed.

When a value is keyed in, the nearest acceptable value is entered.

Values: 0 = off (preset), greater = wider

P823 Reform Echo

Enter the amount (in ms) of long shot Echo Profile smoothing required to eliminate jagged peaks in the Echo Profile.

When a value is keyed in, the nearest acceptable value is entered.

Values: 0 = off (preset), greater = wider

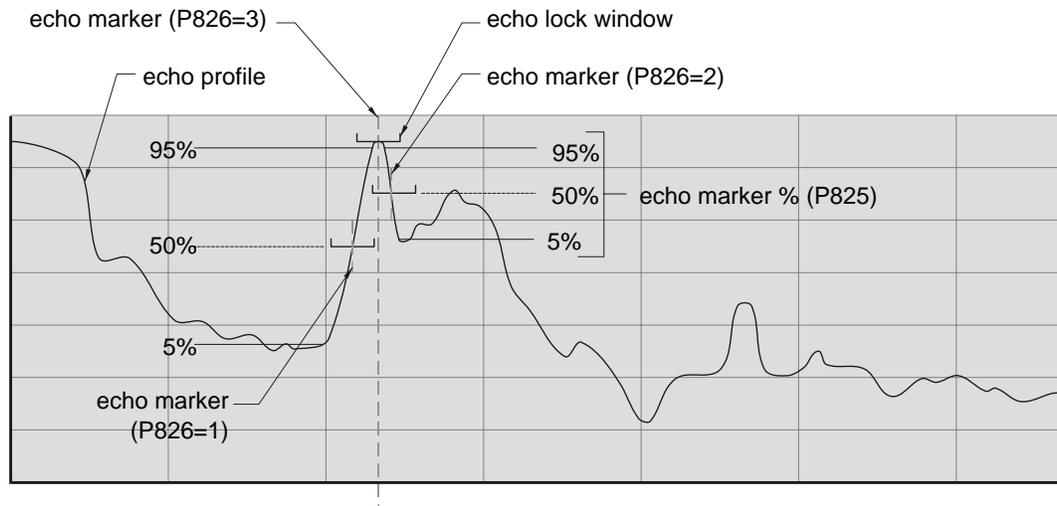
P825 Echo Marker Percentage

Use this feature when the reported material level fluctuates slightly, due to a variable rise in the leading or trailing edge of the selected echo on the Echo Profile.

Enter the value (in percent of echo height) to ensure the Echo Lock Window intersects the Echo Profile at the steepest slope of the selected echo. This value becomes the reported level.

Values: 5 to 95 (preset: 50)

P826 Echo Marker Position



Use this feature to determine which slope on the selected echo is used by the Echo Marker Percentage.

- 1 = **Leading:** The Echo Marker is placed on the leading edge of the selected echo (preset).
- 2 = **Trailing:** the Echo Marker is placed on the trailing edge of the selected echo.
- 3 = **Peak:** the Echo Marker is placed at the peak of the selected echo. The Echo Marker Percentage (P825) is not used.

Note

The Echo Lock Window (P713) is centered about the position of the Echo Marker.

P830 TVT Type

Use this feature to select the TVT Curve most suited to the material and clarifier.

This feature is automatically altered when Material (P002) is altered.

Do not select "TVT SLOPES" when the "bF or bLF" Algorithm (P820) is selected.

Values:

- 1 = TVT Short Curved
- 2 = TVT Short Flat
- 3 = TVT Long Flat
- 4 = TVT Long Smooth Front
- 5 = TVT Long Smooth
- 6 = TVT Slopes

P831 TVT Shaper

Use this feature to turn the TVT Shaper "on" or "off".

Turn the TVT Shaper "on" before altering TVT Shaper Adjust. After TVT Shaper Adjust has been used to modify the TVT Curve (to avoid a false echo or pick up the true echo), this feature allows the TVT Shaper to be turned "on" and "off" while monitoring the effect.

Values:

0 = off

1 = on

P832 TVT Shaper Adjust

Use this feature to bias the shape of the TVT curve away from undesirable echos.

Adjustment to this parameter is best done while viewing the echo profile on an oscilloscope (refer to P810). When using an oscilloscope, the Echo Lock Window display becomes the TVT Curve Pointer.

The TVT curve is divided into 40 breakpoints, accessible by enabling the point number as the breakpoint index field. Each breakpoint is normalized to a value of 0, as displayed in the parameter value field. By changing the breakpoint value, up or down, the intensity of the bias applied to that breakpoint of the curve is respectively changed. By changing the value of adjacent breakpoints, the effective bias to the shaper can be broadened to suit the desired correction. In the case of multiple false echoes, shaping can be applied along different points of the curve. Shaping should be applied sparingly in order to avoid missing the true echo.

To change a breakpoint ...

with the desired transducer point selected



e.g. transducer 1

Pressing sets the point number to index.



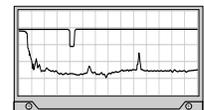
e.g. index, breakpoint 1, value 0

Pressing selects the Auxiliary function



e.g. auxiliary function

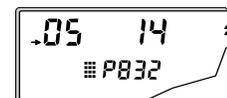
Pressing scrolls the breakpoint index through points 1 to 40, and moves the curve pointer left or right respectively.



e.g. oscilloscope displays breakpoint 5, value 0

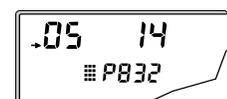
And,

Pressing changes the bias value of the breakpoint, -50 to 50



e.g. breakpoint 5, value 14

Pressing enters the change in value.



To select another transducer . . .

Pressing  sets the point number to transducer. Select desired transducer point.



e.g. return to transducer 1

Note:

P831, TVT shaper, must be 'on'.

P833 TVT Start Min

Use this feature to adjust the TVT Curve height to ignore false echoes (or pick up true echoes) near the start of the Echo Profile.

Enter the minimum TVT Curve start point (in dB above 1 μ V rms).

This feature (preset to 45) should only be used if increased Near Blanking would extend farther than desired into the measurement range.

Values: -30 to 225

P834 TVT Start Duration

Use this feature in conjunction with TVT Start Min (P833) to ignore false echoes (or pick up true echoes) near the start of the Echo Profile.

Enter the time (in ms) for the TVT Curve to decrease from the TVT Start Min (P833) point to the TVT Curve baseline.

Values: 0 to 9999

P835 TVT Slope Min

Enter the minimum slope (in dB/s) for the middle portion of the TVT Curve.

This feature (preset to 9000) is used in conjunction with TVT Start Duration (when a long flat TVT Type is selected) to ensure the TVT Curve remains above false echoes which appear in the middle of the Echo Profile.

Alternatively, if TVT Type is set for "TVT SLOPES" (P830 = 6), this value is preset to 2000.

Use this feature to adjust the slope declination, as required.

Values: 0 to 9999

P836 Max Start Echo (NEW)

Sets the maximum height of the ringdown signal.

Values: 0 to 225 dB (preset = 180 dB)

P841 Long Shot Number

Enter the number of long shots to be fired (and results averaged) per transmit pulse.

Values: 0 to 200

P843 Long Shot Frequency

Use this feature to adjust the long shot transmit pulse frequency (in kHz).

Values: 10.00 to 60.00

P845 Long Shot Width

Use this feature to adjust the length (in ms) of the long shot transmit pulse.

Values: 0.000 to 5.000

P853 Mixer Gain

Use this feature to adjust the gain of the high frequency detector. The result of a gain increase is an increase in the echo amplitude.

Test Parameters (P900 to P913)

Test Parameters are intended for use by Milltronics Service personnel.

P900 (V) Software Rev. #

Access this parameter to determine the EPROM Rev. # without removing the enclosure lid.

Values: 00.00 to 99.99

P901 (V) Memory

Press  to activate the DPS 300 memory test.

When the test is successful, "PASS" is displayed. Otherwise, one of the following values is displayed, indicating the type of memory failure.

Values:

PASS (memory test successful)
F1 = RAM
F2 = NOVRAM
F3 = EEPROM
F4 = EPROM

P902 (V) Watchdog

Press  to reset the microprocessor.

On successful completion (in about 15 seconds) the DPS 300 enters the RUN mode.

P903 (V) Display

Press  to activate the display test.

All LCD segments and symbols are temporarily displayed.

P904 (G) Keypad

Press each keypad key in the following sequence:



As each key is pressed, the associated keypad number is displayed. On successful test completion "PASS" is displayed. "FAIL" is displayed if a key is pressed out of sequence or the programmer keypad malfunctions.

P905 Transmit Pulse

Press  to supply repeated transmit pulses to the transducer and/or view the transducer operating frequency for the Point Number displayed.

This feature may be used to monitor the transmit pulse with an oscilloscope connected to the transducer terminals.

Values: 10.00 to 60.00

P906 Communications

Press  to test the DPS 300 communications circuitry.

Note:

Before activating this feature connect terminal block contacts 27 to 29 and 28 to 30.

On successful test completion, "PASS" is displayed. If "FAIL" is displayed, repeat the test. (The first test performed sets up the auto polarity function).

P907 Programmer Interface

Press  to activate the programmer interface (two way infrared communications) test.

On successful test completion, "PASS" is displayed. Otherwise, "FAIL" is displayed.

P908 Scanner

Press  to activate the scanner test.

When activated, the on board transducer relay is energized and de-energized.

(The transmit pulse is not supplied to the transducer terminals during this test).

P910 Relay

Access this parameter to display the current state of the specified relay.

Press  to alter the relay state (energized / de-energized) or enter the value corresponding to the specific relay state desired.

Values:

0 = de-energized

1 = energized

P911 mA Output Value

Access this parameter to display the current value of the specified mA output.

Additionally, this feature may be used to enter a desired value. The mA output is immediately forced to the value entered, regardless of any restrictions programmed.

Values: 0.000 to 25.00

P912 Transducer Temperature

Access this parameter to display the temperature in °C (as monitored by the connected transducer). "Err" or "OPEn" is displayed if the transducer is not properly connected.

Values: -50 to 150

P913 Sensor Temperature

Access this parameter to display the temperature in °C (as monitored by the connected temperature sensor). "OPEn" is displayed if a TS-3 is not connected.

Values: -50 to 150

Measurement Parameters (P920 to P923)

Use these parameters to verify Application Parameter programming, when performing a dynamic level test over at least 2 empty/fill cycles for each clarifier is impractical.

Access the following parameters to take an ultrasonic measurement and automatically:

- display the corresponding Reading in the Parameter Value field.
- set the mA output value accordingly.
- set the relay status accordingly.
- transmit the corresponding point data.

Note:

If measurements or simulation are desired, however DPS 300 operation has not been verified, disable all associated process control equipment before accessing the following parameters.

To take an ultrasonic measurement, access one of the following parameters and...

1. Press  (repeat 5 times to overcome Echo Lock, P711).

Alternatively, press  to simulate a rising and falling material level. During the simulation, the DPS 300 will operate as though the sludge level was repeatedly cycling from full to empty to full, and so on, at a rate of 1% of Span (P007) per second. See Lock (P000) to activate control relays during simulation.

The simulation starts at level = 0, unless a specific level value was entered beforehand.

2. Press  to switch to the rising (or  for the emptying) simulation as required. Holding the key increases (or decreases) the simulated rate of rise (or fall), to 4% of Span per second.
3. Press  to end the simulation, when desired.

During a measurement or simulation, the DPS 300 display responds as though in the RUN mode, however the value displayed in the Reading field is affected by the Measurement Parameter selected, and the material level is displayed in the Auxiliary Reading field.

P920 Reading Measurement

The Reading corresponds to all associated programming.

P921 Material Measurement

The Reading corresponds to the distance between Empty (P006) and the sludge level.

P922 Space Measurement

The Reading corresponds to the distance between the sludge level and Span (P007).

P923 Distance Measurement

The Reading corresponds to the distance between the sludge level and the transducer face.

P924 Volume Measurement

The Reading corresponds to the volume calculation in percent of Max Volume (P051). Press  as required to display in Max Volume units.

P927 Distance Percent

Same as P923, plus alternate reading in % press .

Master Reset (P999)

P999 Master Reset

A *Global Master Reset* (reset all parameters to preset values) should be performed:

- to clear all operator programming from memory.
- after replacing the DPS 300 EPROM with a different software revision number.

Note:

Following a Global Master Reset, complete reprogramming is required.

A *Point Number Master Reset* (reset the non-global parameters of the displayed Point Number to preset values) should be performed if a Point Number is being reassigned to a different clarifier.

To perform a Global Master Reset:

1. With the Parameter Number field accessed, key in 999,
2. With the Point Number field accessed, key in 00,
3. Press **C** **↵** "C.ALL" is displayed until the reset is complete.

To perform a Point Number Master Reset:

1. With the Parameter Number field accessed, key in 999,
2. With the Point Number field accessed, key in the Point Number to be reset (1, or 2)
3. Press **C** **↵** , "C.ALL" is displayed until the reset is complete.

Transmit Pulse

The DPS 300 transmit pulse consists of one or more electrical “shot” pulses, which are supplied to the scanning relay. The scanning relay is activated as required, to supply the transmit pulse to the Transducer(s) connected to the DPS 300 terminals.

The transducer fires an acoustic “shot” for each electrical pulse supplied. After each shot is fired, sufficient time is provided for *echo* (shot reflection) reception, before the next (if applicable) shot is fired. After all shots of the transmit pulse are fired, the resultant echoes are processed.

The InterRanger™ DPS 300 uses a dual frequency transceiver to provide more accurate results than a single frequency system. A low frequency is used to achieve good penetration in sludge where a lot of suspended solids are present, and at the same time a high frequency is used to obtain reflections from lighter, less dense sludge layers.

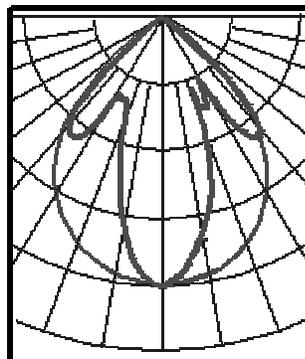
Transducer

The Milltronics XCT12 transducer is a very versatile transducer because it can be used at several different frequencies outside its normally selected frequency. This effect comes from the higher order vibrational 'modes' that exist in any physical structure. In the case of the XCT12 transducer the high frequency used is 150KHz. The transducer is a powerful emitter at its lower frequency (42KHz) and this effect is useful both for good penetration in certain sludge types and for keeping the transducer's active face clean for longer periods of time.

Beam Patterns

The transducer's beam pattern changes in water because the speed of sound is much higher (1483m/s @ 20°C) than in air (343m/s @ 20°C). As shown in the polar response graph, the 150 kHz beam pattern has a fairly narrow centre beam with residual side-lobes, and the larger, elliptical plot illustrates the 44Khz response. Radial divisions are in 10dB steps.

Beam Pattern
for XCT-12.



One of the reasons that the XCT12 transducer is more suitable for underwater use is its larger radiating face, were a smaller transducer to be used, the beam angles would be wider.

Echo Processing

Echo processing consists of echo enhancement, true echo selection, and selected echo verification. In clarifiers a large range of signals can be seen in a small distance. The processing electronics needs to be configured carefully to get consistent, accurate results.

Echo Enhancement is achieved by *filtering* (removing noise, P821 and P822) and *reforming* (connecting fragmented echo peaks, P823) the *echo profile* (digitized signal representing the echo signal received).

True echo selection is achieved by establishing the criteria which a portion of the echo profile must meet to be considered the *true echo* (echo reflected by the intended target).

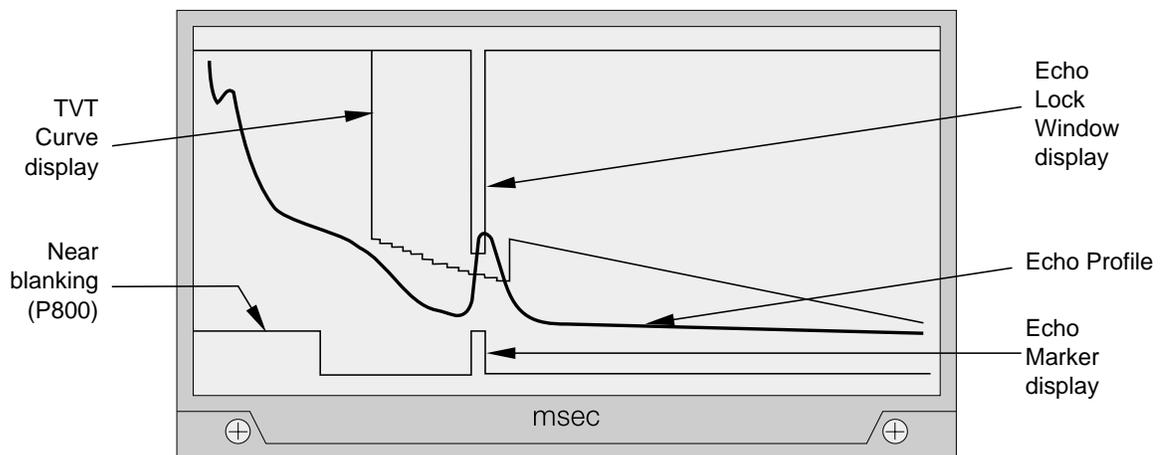
Insignificant portions of the echo profile outside of the measurement range (Span P007 + Range Extension P801), below the TVT Curve (P830 to P835), and less than the Confidence Threshold (P804) are automatically disregarded.

The remaining portions of the Echo Profile are evaluated using the Algorithm (P820) programmed. When a combination of Algorithms are used, the portion of the Echo Profile providing the best averaged Echo Confidence (P805), is selected as the true echo.

True echo verification is automatically achieved by comparing the position (relation in time after transmit) of the "new" echo to the previously accepted echo position.

If the new echo is within the Echo Lock Window (P713), the new echo is accepted and displays, outputs, and relays are updated as restricted by the Fuzz Filter (P710) and Rate Parameters (P700 to P703). If the new echo is outside of the Echo Lock Window, the new echo is not accepted until *Echo Lock* (measurement repeatability, P711) requirements are satisfied.

Echo Processing Displays (Scope Displays, P810)



Distance Calculation

To calculate the transducer to sludge distance, the sound velocity (P653) is multiplied by the acoustic transmission to reception time period.

$$\text{Distance} = \frac{\text{Sound Velocity} \times \text{Time}}{2}$$

The Reading Value displayed is the result of performing any additional modification to the calculated distance (Operation P001, Units P005, Volume Conversion, P050 to P054, Reading Value, P060 to P063.)

Sound Velocity

The velocity of sound in water is affected by its temperature. The DPS 300 is preset for operation in water at 20°C (68°F). Unless altered, the sound velocity used for the distance calculation is 1483 m/s (4864 ft/s).

The XCT-12 transducer incorporates a temperature sensing element which provides temperature reporting to the DPS 300 for automatic compensation of sound velocity.

Also, if the temperature varies between the transducer face and the sludge surface, a TS-3 temperature sensor, mounted in between can be used in combination with the transducer. Then when Temp Source, (P660) is set for "both", the transducer and TS-3 temperature measurements are averaged.

Scanning

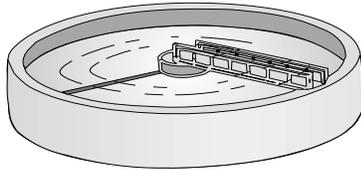
When echo processing is complete, (if two clarifiers are monitored) the scanning relay changes state to supply the transmit pulse to the transducer of the other clarifier after the Scan Delay (P727).

Volume Calculation

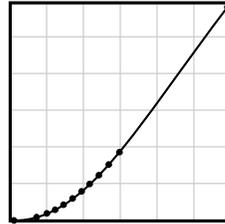
The DPS 300 provides a variety of volume calculation features (P050 to P055).

If the clarifier to be monitored does not match any of the 8 preset shape calculations, a Universal Volume calculation may be used. Use the level/volume graph or chart provided by the clarifier fabricator (or create one based on the clarifier dimensions).

From this graph, determine which Universal Volume calculation will provide the best results, and select the level vs. volume breakpoints to be entered (32 max.). Generally, the more breakpoints entered, the greater the volume calculation accuracy.



clarifier



linear calculation

Universal, Linear (P050 = 9)

This volume calculation creates a piece-wise linear approximation of the level/volume curve. This option provides best results if the curve has sharp angles joining relatively linear sections.

Enter a Level Breakpoint at each point where the level/volume curve bends sharply (2 minimum).

For combination curves (mostly linear but include 1 or more arcs), ensure numerous breakpoints are entered along the arc, for best volume calculation accuracy.

Universal, Curved (P050 = 10)

This volume calculation creates a cubic spline approximation of the level/volume curve. This option provides best results if the curve is non-linear, and there are no sharp angles.

Select at least enough breakpoints from the curve to satisfy the following:

- 2 breakpoints very near the minimum level
- 1 breakpoint at the tangent points of each arc
- 1 breakpoint at each arc apex
- 2 breakpoints very near the maximum level

For combination curves, ensure at least 2 breakpoints are entered immediately before and after any sharp angle (as well as 1 breakpoint exactly at the angle) on the curve.

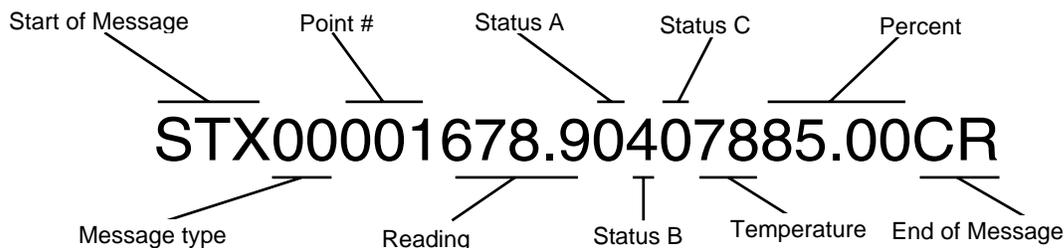
Communication Support

The DPS 300 provides digital communication to a peripheral device, such as a computer or PLC, in one of three modes via the communication port, terminals 26 through 32. The mode of communication is established by the configuration of the connection made at the DPS 300, either RS-232, RS-485 or bipolar current loop.

The DPS 300 utilizes *simplex convention* communication protocol. Data messages are continuously transmitted at regular intervals (no poll is required) at 4800 baud. All data is transmitted in structured messages of ASCII characters consisting of 8 data bits, no parity, and 1 stop bit.

If Peripheral Communications (P740) is set for “formatted” messages, a comma is inserted between each message field (except immediately preceding the “End of Message” characters).

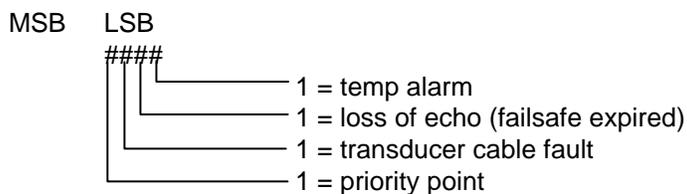
MT-00 Measurement Message



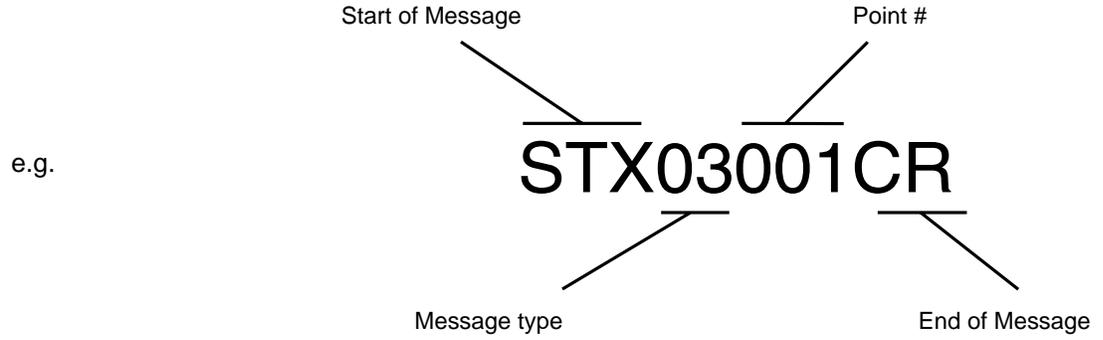
Field Name	Definition
Start Of Message	STX (\$02)
Message Type	2 characters, 00 (indicates the following data pertains to a scan point measurement)
Point #	3 characters, 001 to 003 (e.g. the message pertains to Point Number 1)
Reading	5 characters, 0.000 to 9999. (e.g. reading = 678.9, DDDD. = no data, EEEE. = overflow)

Status A

1 character, \$0 to \$F (convert to binary, e.g. temp, echo, and cable OK, not priority)



MT-03 POINT NOT SCANNED



<i>Field Name</i>	<i>Definition</i>
Start Of Message	STX (\$02)
Message Type	2 characters, 03 (indicates the Point Number is not in service)
Point #	3 characters, 001 to 003 (e.g. Point Number 1)
End Of Message	CR (\$0D)

The DPS 300 should require little maintenance, though good housekeeping practices in and around the area of the enclosure are recommended.

Wipe out the area of the enclosure lid docking bay recess with a clean dry cloth (if necessary) before installing the programmer.

Inspect the transducer regularly. By nature of its ultrasonic emissions, the face has self cleaning properties. However, scum and algae can build up on the sides, and if not removed, can encroach onto the face, adversely affecting performance.

Depending on the application, the transducer face may require cleaning to maintain an acceptable performance level.

Measurement Difficulties

If a measurement difficulty occurs for greater than the Failsafe Timer (P070) setting, “LOE” is flashed alternately with the Reading display. Under certain conditions, a measurement difficulty may cause the DPS 300 to “lock on” to a false echo and report a fixed or wrong reading.

Flashing “LOE” Display

If “LOE” is displayed, ensure that the:

1. Sludge surface is within the maximum range of the transducer (see Transducer on page 6).
2. Transducer is located properly (see Application Planning on page 15).

To display Echo Confidence in the RUN mode press  and hold for 4 seconds (Failsafe Time Left changes to the Short : Long Confidence display).

To display Echo Confidence in the program mode, access the Echo Confidence (P805) parameter. To update the value displayed after each aiming adjustment press  (5 times or more to verify stability).

Increase the Failsafe Timer (P070) value, if failsafe operation will not be compromised by the larger value.

LOE may be an indication that the sludge is at a level exposing the clarifier at that point. The slope bottom of the clarifier may be reflecting the echo away from the transducer. Move the transducer to a location where there is still a sludge blanket or limit the sludge low level.

If a discernible echo from the sludge is observed, reduce the Confidence Threshold (P804) while taking new measurements (in the RUN or program mode).

Fixed Reading

If the Reading is a fixed value, regardless of the transducer to sludge distance, ensure the:

1. Transducer sound beam is free from obstruction.
2. Sludge level is not within the Transducers' nearest measurable distance.

If the obstruction cannot be removed or avoided, the DPS 300 TVT (Time Varying Threshold) Curve must be modified to reduce the Echo Confidence derived from the sound reflected by the obstruction. (See ENHANCEMENT PARAMETERS / Scope Displays, P810 and TVT Shaper, P832).

If the fixed Reading represents a minimal distance from the transducer face, the condition may be caused by a sound beam obstruction (check for this first), but could also be due to other factors.

If the sludge surface is within the Transducers' *nearest distance*, limit the high level of the sludge blanket.

If the preceding remedies have not produced satisfactory results, the false echo has to be ignored. Extend Near Blanking (P800) to a distance (from the transducer face) to just beyond the distance represented by the Reading. This also increases the nearest distance the sludge may come within the transducer face and still be detected.

Connect an oscilloscope to the DPS 300, (see ENHANCEMENT PARAMETERS / Scope Displays, P810). Adjust the TVT Start Min (P833), TVT Start Duration (P834), and TVT Slope Min (P835) slightly, to raise the TVT curve in the area of the false echo.

Continue making minor TVT Curve adjustments and taking new measurements while observing the Echo Marker position until the Echo Lock Window repeatedly locks onto the true echo. Verify the false echo is still ignored, regardless of the sludge level, or empty/fill activity.

Wrong Reading

If the Reading is erratic, or jumps to some incorrect value periodically, ensure the:

1. Sludge level is not beyond the transducers maximum range.
2. Material (P002) value matches the type of sludge monitored.

If the periodic incorrect value is always the same, see Fixed Reading. If the incorrect value seems to be random, verify the material surface to transducer distance is less than the Empty value entered plus 20%. If the sludge monitored is outside this distance, increase Range Extension (P801) as required.

Variable Reading

If the material reading is “jumping” from the correct level, try the following techniques:

- Set the Long Shot Number (P841) to a larger value to average more shots to get a measurement
- Set Echo Lock (P711) to “max verification” (response to sludge level changes may be slowed somewhat).
- Increase the Echo Lock Sampling (P712) and / or decrease the Echo Lock Window (P713) to ignore erroneous readings
- Decrease the Long Shot Width (P845) to keep the different echos in the profile distinct

Access the Noise (P807) parameter. If the peak value jumps wildly, verify the transducer cable shields are connected to the DPS 300 shield terminals and not to ground elsewhere.

If the DPS 300 is mounted in proximity to (or transducer cables run near those of) another ultrasonic level monitor. If they do, see Level System Sync (P726).

Temporarily disable nearby SCR control drives, high voltage or current contactors. If the condition disappears, move the DPS 300 to another location.

Increase the Confidence Threshold (small amounts at a time) while observing the results. If performance is not improved return the Confidence Threshold to the preset value.

Connect an oscilloscope to the DPS 300, (see ENHANCEMENT PARAMETERS / Scope Displays, P810). While monitoring the Echo Marker, select the Algorithm (P820) best suited to the clarifier.

If the "Area" algorithm is used and narrow noise spikes are evident on the (long shot) Echo Profile, turn the Spike Filter (P821) on and/or widen the Narrow Echo Filter (P822). Also, if the true echo has jagged peaks, use Reform Echo (P823).

Should a stable measurement still not be attainable, contact Milltronics or your local distributor.

DEFAULT PARAMETER SETTINGS

P002=	0	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17
FAILSAFE																		
P070	0	20	20	20	20	20	20	20	20	20	20	20	20	20	20	20	20	20
P072	2	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
RANGE CALIBRATION																		
P654	344	1483	1483	1483	1483	1483	1483	1483	1483	1483	1483	1483	1483	1483	1483	1483	1483	1483
TEMPERATURE COMPENSATION																		
P700	1000	0.1	0.1	0.2	0.2	0.1	0.1	0.1	0.2	0.2	0.1	0.1	0.2	0.2	0.1	0.1	0.1	0.1
P701	1000	0.1	0.1	0.2	0.2	0.1	0.1	0.1	0.2	0.2	0.1	0.1	0.2	0.2	0.1	0.1	0.1	0.1
P702	100	0.01	0.01	0.02	0.02	0.01	0.01	0.01	0.02	0.02	0.01	0.01	0.02	0.02	0.01	0.01	0.01	0.01
P703	100	0.01	0.01	0.02	0.02	0.01	0.01	0.01	0.02	0.02	0.01	0.01	0.02	0.02	0.01	0.01	0.01	0.01
P704	2	4	4	3	3	4	4	4	3	3	4	4	3	3	4	4	4	4
P705	1	600	600	300	300	600	600	600	300	300	600	600	300	300	600	600	600	600
P706	0.01	0.3	0.3	0.1	0.1	0.3	0.3	0.3	0.1	0.1	0.3	0.3	0.1	0.1	0.3	0.3	0.3	0.3
MEASUREMENT VERIFICATION																		
P710	0	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100
P711	0	1	1	1	1	1	1	3	1	1	3	3	3	3	1	1	3	3
P712	1:1	7:3	7:3	5:2	5:2	7:3	7:3	7:3	5:2	5:2	7:3	2:2	5:2	5:2	7:3	7:3	5:3	5:3
DISPLAY																		
P733	0	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
ECHO PROCESSING																		
P800	0.5	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
P804	0:5	0:10	0:10	0:10	0:10	0:5	0:5	0:5	0:5	0:5	0:5	0:5	0:5	0:5	0:10	0:10	0:10	0:10
P820	F	L	L	L	L	F	F	F	F	F	F	F	F	F	L	L	L	F
P823	0	0	0	0	0	0.5	0.5	0.5	0.5	0.5	1	1	1	1	0	0	0	1
P825	50	50	50	50	50	10	10	10	10	10	10	10	10	10	50	50	50	10
P830	1	1	1	1	1	4	4	4	4	4	4	4	4	4	1	1	1	4
P841	1	50	50	50	50	30	30	30	30	30	50	50	50	50	30	30	50	50
P843	44	51	51	51	51	51	51	51	51	51	51	51	51	51	51	51	51	51
P845	1	0.2	0.2	0.2	0.2	0.04	0.04	0.04	0.04	0.04	0.04	0.04	0.04	0.04	0.2	0.2	0.2	0.04
P853	0	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100

PROGRAMMING CHARTS

Programming Chart 1

PARAMETER		ALTERED VALUES FOR POINT #'S		
#	NAME	1	2	3

SECURITY				
P000	Lock (G)			
QUICK START				
P001	Operation			
P002	Material			
P005	(G) Units			
P006	Empty			
P007	Span			
VOLUME				
P050	Tank Shape			
P051	Max Volume			
P052	Tank Dimension A			
P053	Tank Dimension L			
P054	Level Breakpoints	record values on a separate sheet		
P055	Breakpoint Volumes	record values on a separate sheet		
READING VALUE				
P060	Decimal Position			
P061	Convert Reading			
P062	Offset Reading			
FAILSAFE				
P070	Failsafe Timer			
P071	Failsafe Material Level			
P072	Failsafe Level Advance			
RELAYS				
P100	(G) Relay Set Up			
P101	High Alarm			
P102	Low Alarm			
P103	High High Alarm			
P104	Low Low Alarm			
P110	Relay Allocation			
P111	Relay Function			
P112	Relay A Setpoint			
P113	Relay B Setpoint			
P116	Bound Alarm Deadband			
P129	Relay Failsafe			

Programming Chart 2

PARAMETER		ALTERED VALUES FOR POINT #'S		
#	NAME	1	2	3

mA OUTPUTS				
P200	mA Range			
P201	mA Function			
P202	mA Allocation			
P203	(V) mA Value / Transducer			
P210	0/4 mA Setpoint			
P211	20 mA Setpoint			
P212	mA Min Limit			
P213	mA Max Limit			
P214	4 mA Trim			
P215	20 mA Trim			
P219	mA Failsafe			
DATA LOGGING				
P300	(V) Temp, Transducer Max			
P302	(V) Temp, Sensor Max			
P330	Profile Record			
P331	(G) Auto Record Enable			
P332	(G) Auto Record Transducer			
P333	(G) Auto Record Interval			
P334	(G) Auto Record A Setpoint			
P335	(G) Auto Record B Setpoint			
P336	(G) Auto Record Filling/Emptying			
P337	(G) Auto Record LOE Time			
P340	(V) Date of Manufacture			
P341	(V) Run Time			
P342	(V) Start Ups			
RANGE CALIBRATION				
P650	Offset Calibration			
P651	Sound Velocity Calibration			
P652	Offset Correction			
P653	Velocity			
P654	Velocity at 20°C			
TEMPERATURE COMPENSATION				
P660	Temp Source			
P661	Temp Fixed			
P662	Temp Sensor Allocation			
P663	Temp Transducer Allocation			

Programming Chart 3

PARAMETER		ALTERED VALUES FOR POINT #'S		
#	NAME	1	2	3
RATE				
P700	Max Fill Rate			
P701	Max Empty Rate			
P702	Filling Indicator			
P703	Emptying Indicator			
P704	Rate Filter			
P705	Rate Update Time			
P706	Rate Update Distance			
P707	(V) Rate Value			
MEASUREMENT VERIFICATION				
P710	Fuzz Filter			
P711	Echo Lock			
P712	Echo Lock Sampling			
P713	Echo Lock Window			
DISPLAY				
P730	(G) Auxiliary Reading			
P731	(G) Auxiliary Reading Key			
P732	(G) Display Delay			
P733	(G) Scroll Access			
P740	Peripheral Communications			
P748	RS485 Termination			
P749	Serial Bus Type (V)			
P790	Hardware Error			
P791	Bus Error			
P792	Bus Error Count			
ECHO PROCESSING				
P800	Near Blanking			
P801	Range Extension			
P804	Confidence Threshold			
P805	(V) Echo Confidence			
P806	(V) Echo Strength			
P807	(V) Noise			

Programming Chart 4

PARAMETER		ALTERED VALUES FOR POINT #'S		
#	NAME	1	2	3

ADVANCED ECHO PROCESSING				
P810	Scope Displays			
P815	(V) Echo Time			
P816	(V) Echo Time Raw			
P817	(V) Profile Pointer Time			
P818	(V) Profile Pointer Distance			
P819	(V) Profile Pointer Amplitude			
P820	Algorithm			
P821	Spike Filter			
P822	Narrow Echo Filter			
P823	Reform Echo			
P825	Echo Marker Trigger			
P826	Echo Position			
P830	TVT Type			
P831	TVT Shaper			
P832	TVT SHAPER ADJUST	record values on a separate sheet		
P833	TVT Start Min			
P834	TVT Start Duration			
P835	TVT Slope Min			
P841	Long Shot Number			
P843	Long Shot Frequency			
P845	Long Shot Width			
P853	Mixer Gain			

www.milltronics.com

MILLTRONICS

Siemens Milltronics Process Instruments Inc.
1954 Technology Drive, P.O. Box 4225
Peterborough, ON, Canada K9J 7B1
Tel: (705) 745-2431 Fax: (705) 741-0466
www.milltronics.com

© Siemens Milltronics Process Instruments Inc. 2001
Subject to change without prior notice



Printed in Canada