

# Fisher® Level Instruments



FIELDVUE DLC3010 DIGITAL LEVEL  
CONTROLLER IN COMBINATION WITH  
A FISHER 249W SENSOR



X0682

FISHER 2100E  
ELECTRIC LEVEL SWITCH



W8418-1

FISHER L2 PNEUMATIC  
LEVEL CONTROLLER



X0660

FISHER L2e ELECTRIC  
LEVEL CONTROLLER

- **FIELDVUE™ Digital Level Instruments**— Microprocessor-based, communicating digital level transmitter for liquid level, specific gravity (density), and liquid level interface. Using HART® or FOUNDATION™ fieldbus communications protocol, the DLC3010/DLC3020f digital level controller gives easy access to information critical to process operation. Available in combination with a 249 sensor to meet mounting requirements.
- **Fisher 2100E electric switch and 2100 on-off pneumatic switch**— Sense high or low liquid levels. Typically, these switches electrically or pneumatically operate safety shutdown systems for field processing equipment in oil and gas industry applications
- **Liquid Level Controllers**— Displacer type sensors used to detect liquid level or interface of two liquids of different specific gravities. The L2e electric level controller, in conjunction with the Fisher easy-Drive™ actuator, can provide a fully electric level control loop; the L2 pneumatic level controller offers snap-acting, throttling control, while the on-off/direct acting L2sj controller features a low-bleed relay to help to conserve natural gas to reduce emissions.
- **Pneumatic Liquid Level Instruments**— Proportional control mode. The 2500 controller/transmitter receives the change in fluid level or fluid-to-fluid interface level from the change in buoyant force the fluid exerts on the sensor displacer. Available in combination with a 249 sensor to meet mounting requirements.



# FIELDVUE Digital Level Instruments

FIELDVUE DLC3010 digital level controllers (figures 1 and 3) are loop-powered instruments. In conjunction with a 249 sensor, they measure changes in liquid level, the level of an interface between two liquids, or liquid specific gravity (density). The DLC3020f is a fieldbus-powered instrument that measures liquid level or interface between two liquids. A level, density, or interface level change in the measured fluid causes a change in the displacer position.

This change is transferred to the torque tube assembly and to the digital level controller lever assembly. The rotary motion moves a magnet attached to the lever assembly, changing the magnetic field that is sensed by the Hall-effect sensor. In the DLC3010, the sensor converts the magnetic field signal to a varying electronic signal, which is converted to a 4-20 mA output signal. In the DLC3020f, the sensor converts the changing magnetic field to a digital signal, which is ambient temperature compensated, linearized, and sent to the electronics assembly.

**Standard or Custom Configuration...** the DLC3010 digital level controller in combination with a 249W sensor enables users to install digital level transmitters to a variety of industry standard or custom process vessel connections. The sensor consists of a wafer body, torque tube assembly and displacer and is rated for CL150, 300, and 600. The wafer body mounts between NPS 3 or 4 raised face flanges. Custom configurations are also available to meet your specific application requirements. Refer to the DLC3010/DLC3020f specifications in tables 1, 2, 3, and 9, and the 249 specifications in tables 4, 5, 6, 7, 8, and 9 for product line capabilities and options.

**HART/AMS Compliant...** The DLC3010 uses HART protocol to interface with the Field Communicator (see figure 1) for field interface operations. Advanced user-interface capabilities are enabled by AMS Suite: Intelligent Device Manager.

**FOUNDATION fieldbus/AMS Compliant...** The DLC3020f uses FOUNDATION fieldbus protocol to interface with the Field Communicator (see figure 1) for field interface operations. Advanced user-interface capabilities are enabled by AMS Suite: Intelligent Device Manager (see figure 2).

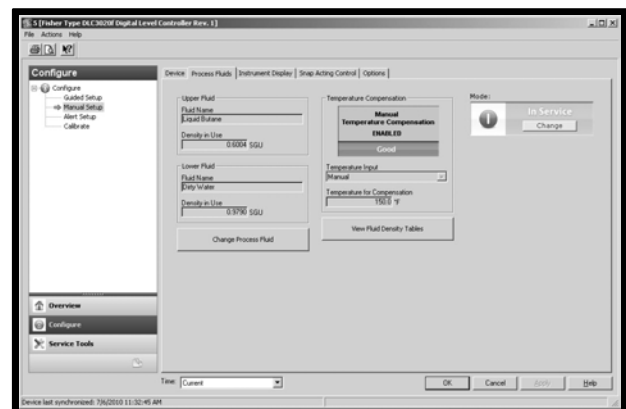
Figure 1. Fisher DLC3010 Digital Level Controller in Combination with a 249W Sensor—Installed in a Typical Customer-Supplied Cage



475 FIELD COMMUNICATOR

W8678

Figure 2. AMS Suite: Intelligent Device Manager Configuration Screen



**Simplified Setup and Calibration...** With the electronic Device Setup, digital level controller startup is straightforward and fast. Level and temperature alarms, specific gravity tables, calibration trim, and trending are readily configurable. DLC3010/DLC3020f digital level controllers also support re-ranging without a fluid reference.

**Responsive to Small Process Change...** Accurate, high-gain analog-to-digital conversion enables measurement of small changes in the process variable. In addition, an input filter and output damping may be adjusted by the user to attenuate noise from mechanical disturbance or liquid turbulence at the displacer.

**Easy Maintenance...** Field wiring connections are in a compartment separated from the electronics. This helps to protect the electronics from any moisture brought into the housing by the field wiring. This also eases installation and maintenance. The digital level controller does not have to be removed to facilitate troubleshooting or service. However, if it is necessary to remove the digital level controller for in-shop maintenance and calibration, field wiring does not need to be disconnected.

Figure 3. FIELDVUE DLC3020f Digital Level Controller



W6102-1

**Note**

Mountings for Masoneilan, Yamatake and Foxboro/Eckhardt sensors are available. Contact your Emerson Process Management sales office for mounting kit information.

Table 1. FIELDVUE DLC3010 General Specifications

Controller Selections <sup>(1)</sup>	For use with 249 caged and uncaged displacer sensors	DLC3010
<b>Input Signal</b>		Level, Interface or Density: Rotary motion of the torque tube shaft proportional to changes in liquid level, interface level, or density that change the buoyancy of the displacer. Process Temperature: Interface for 2- or 3-wire 100 ohm platinum RTD for sensing process temperature, or optional user-entered target temperature to permit compensating for changes in specific gravity
<b>Output Signal</b>	Analog	4-20 mA DC direct (increasing input increases output) or reverse action
	Digital	HART 1200 baud FSK (frequency shift keyed)
<b>Supply</b>		12-30 VDC; the instrument has reverse-polarity protection
<b>Ambient Relative Humidity</b>		0 to 95% non-condensing
<b>Approximate Weight (Controller)</b>		2.7 kg (6 pounds)
<b>Option</b>		Heat insulator
<b>Electrical Housing</b>		NEMA 4X, CSA Enclosure, IP66
<b>Hazardous Area Classification<sup>(2)</sup></b>		CSA—Intrinsically Safe, Explosion-proof, Division 2, Dust Ignition-proof
		FM—Intrinsically Safe, Explosion-proof, Non-incendive, Dust Ignition-proof
		ATEX—Intrinsically Safe, Type n, Flameproof
		IECEx—Intrinsically Safe, Type n, Flameproof
<p>1. Also refer to tables 4, 5, 6, and 7. 2. Other Certifications/Classifications available. Contact your Emerson Process Management Sales office for additional information.</p>		

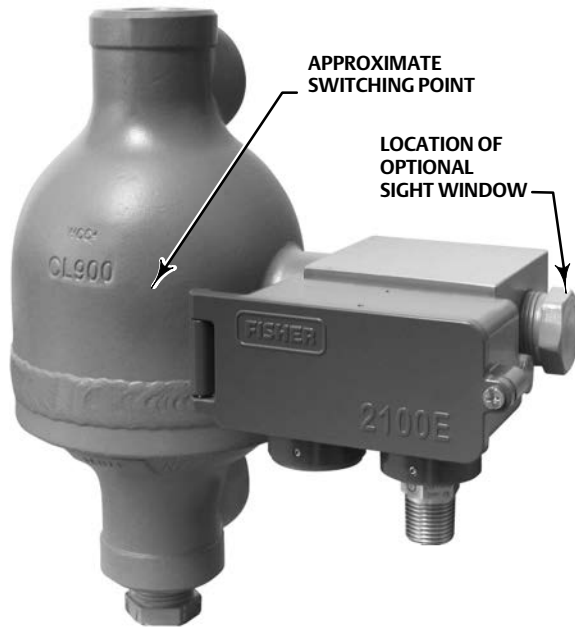
Table 2. FIELDVUE DLC3020f General Specifications

Controller Selections <sup>(1)</sup>	For use with 249 caged and uncaged displacer sensors	DLC3020f
<b>Device Inputs</b>		Level Sensor Input: Rotary motion of the torque tube shaft proportional to buoyant force of the displacer caused by changes in liquid level or interface level. Process Temperature: Interface for 2- or 3-wire 100 ohm platinum RTD for sensing process temperature; AO Block - Foundation fieldbus temperature transmitter; Manual - compensation values entered manually in the device
<b>Digital Communication Protocol</b>		Foundation fieldbus registered device (ITK 5)
<b>Supply</b>		9 to 32 volts DC, 17.7 mA DC; instrument is not polarity sensitive
<b>Ambient Relative Humidity</b>		0 to 95% non-condensing
<b>Approximate Weight (Controller)</b>		2.7 kg (6 pounds)
<b>Option</b>		Heat insulator
<b>Electrical Housing</b>		Type 4X, NEMA 4X, IP66
<b>Hazardous Area Classification<sup>(2)</sup></b>		CSA—Intrinsically Safe, Explosion-proof, Division 2, Dust Ignition-proof
		FM—Intrinsically Safe, Explosion-proof, Non-incendive, Dust Ignition-proof
		ATEX—Intrinsically Safe, Type n, Flameproof
		IECEx—Intrinsically Safe, Type n, Flameproof
1. Also refer to tables 4, 5, 6, and 7. 2. Other Certifications/Classifications available. Contact your Emerson Process Management Sales office for additional information.		

Table 3. FIELDVUE DLC3010/DLC3020f Performance<sup>(1)</sup>

Performance Criteria	Stand-Alone		DLC3010 w/ NPS 3 249W, Using a 14-inch Displacer	DLC3010 w/ All Other 249 Sensors
	DLC3010	DLC3020f <sup>(2)</sup>		
<b>Independent Linearity</b>	± 0.25% of output span	± 0.1% of output span	± 0.8% of output span	± 0.5% of output span
<b>Hysteresis</b>	< 0.2% of output span	< 0.50% of output span	---	---
<b>Repeatability</b>	± 0.1% of full scale output	< 0.10% of output span	± 0.5% of output span	± 0.3% of output span
<b>Dead Band</b>	< 0.05% of input span	± 0.10% (RH9.2% to 90%)	---	---
<b>Hysteresis and Dead Band</b>	---	---	< 1.0% of output span	< 1.0% of output span
<b>Accuracy</b>	---	± 0.15%	---	---
<b>Process Sensor Range (Input Signal)</b>	Fluid Level or Fluid Interface Level	From 0 to 100 percent of displacer length <sup>(3)</sup> —standard lengths for all sensors are 356 mm (14 inches) or 813 mm (32 inches); other lengths available depending on sensor construction		
	Fluid Density (DLC3010)	From 10 to 100 percent of displacement force change obtained with given displacer volume—standard volumes are 1016 cm <sup>3</sup> (62 in <sup>3</sup> ) for 249C and 249CP sensors and 1622 or 1360 cm <sup>3</sup> (99 or 83 in <sup>3</sup> ) for most other sensors; other volumes available depending upon sensor construction		
<b>Allowable Specific Gravity (Standard)</b>	Fluid Level or Fluid Interface Level	Specific gravity range, 0.05 to 1.10; Minimum differential specific gravity 0.05 <sup>(4)</sup>		
	Fluid Density (DLC3010)	Specific gravity range, 0.1 to 1.10; Minimum change in specific gravity 0.05 <sup>(4)</sup>		
<b>Zero Adjustment</b>	Fluid Level or Fluid Interface Level	Continuously adjustable to position span of less than 100 percent anywhere within displacer length, and report the value in engineering units with any desired bias.		
	Fluid Density (DLC3010)	Continuously adjustable to position span of less than 90 percent anywhere within 10 to 100 percent of displacement force change obtained with given displacer volume.		
1. At full design span, reference conditions. 2. To lever assembly rotation inputs. 3. The torque tube and the displacer must be properly sized for the application in order for 0 to 100% of displacer length to be available. 4. With a nominal 4.4 degrees torque tube shaft rotation for a 0 to 100 percent change in liquid level (specific gravity=1), the digital level controller can be adjusted to provide full output for an input range of 5% of nominal input span. This equates to a minimum differential specific gravity of 0.05 with standard volume displacers. Operating at 5% proportional band will degrade accuracy by a factor of 20. Using a thin wall torque tube, or doubling the displacer volume will each roughly double the effective proportional band. When proportional band of the system drops below 50%, changing displacer or torque tube should be considered if high accuracy is a requirement.				

Figure 4. Fisher 2100E Electric Liquid Level Switch



X0682

Figure 5. Fisher 2100 Pneumatic Liquid Level Switch



W9954-1

## Fisher 2100 Liquid Level Switches

Typically, 2100E and 2100 switches electrically or pneumatically operate safety shutdown systems for field processing equipment in oil and gas industry applications

Switch construction comes in a left-hand as well as a right-hand mounting version. The explosion-proof, hermetically sealed 2100E switch is offered as both a factory mounting and as an electric switch retrofit to the proven 2100 switch.

With the 2100E switch rising liquid level exerts a buoyant force on the torque tube that either activates or deactivates an electrical SPDT or DPDT switch

depending on the switching action desired. Falling liquid level deactivates or activates the same switch depending on the action desired.

When the 2100 switch is in the normal position with the flapper against the nozzle, output pressure cannot bleed off and remains the same as full supply pressure. Rising liquid level exerts a buoyant force on the displacer, producing a torque on the torque tube. When the torque transmitted by the torque tube exceeds the torque exerted on the flapper by the magnet, the flapper snaps away from the nozzle, allowing output pressure to bleed through the nozzle faster than supply pressure can enter through the bleed orifice. The reduced pressure in the output signal line activates the shutdown or alarm system. When the liquid level lowers, the falling displacer forces the flapper into the field of the magnet, letting the magnet snap the flapper against the nozzle and causing output pressure to build to full supply pressure.

## Fisher L2, L2e, and L2sj Liquid Level Controllers

Rugged L2, L2e, and L2sj liquid level controllers use a displacer type sensor to detect liquid level or the interface of two liquids of different specific gravities.

The reliability of the design make these controllers well suited for high pressure liquid level applications in natural gas production, compression, and processing industries.

The L2 and L2sj devices deliver a pneumatic output signal to a control valve.

The L2e device uses a single pole double throw (SPDT) dry contact electric switch to provide differential gap (DG) control or liquid monitoring. It can be used to provide an electric control signal to an electrically actuated control valve.

The sensor uses a threaded 2 NPT connection to the vessel. Standard constructions use materials that comply with the requirements of NACE MR0175-2002.

L2, L2e, and L2sj controllers, in combination with the sensor, work on the principle that a body immersed in liquid will be buoyed up by a force equal to the weight of the liquid displaced. The buoyant force and resultant movement of the displacer in the liquid is transmitted to the controller which delivers the signal to a control valve.

### L2 Liquid Level Controllers

**Snap-Acting or Throttling Control...** One standard controller available as either throttling or snap-acting.

**Field-Reversible Output...** The controller can be adjusted in the field for direct or reverse action without additional parts. The controller also has adjustable gain sensitivity.

**Easy Maintenance...** Both the controller and the sensor can be easily disassembled to inspect the process seals and for maintenance.

Figure 6. Fisher L2 Liquid Level Controller



W8418-1

### L2e Electric Level Controllers

**Effective Level Loop Tuning...** Intuitive Zero and Span adjustments allow flexibility in setting loop performance over a level range of 5.0 to 559 mm (0.2 to 22 inches).

**More Reliable Control...** Premium quality hermetically-sealed switch with gold contacts and advanced knife-edge sensing provide highly dependable and accurate liquid level control.

**Environmentally Responsible...** Replacing a conventional pneumatic level loop with fully electric level control eliminates controller and dump valve venting and requires less maintenance.

Figure 7. Fisher L2e Liquid Level Controller



X0660

## L2sj Liquid Level Controllers

Designed for use with Natural Gas... The L2sj controller is intended for use with natural gas as the pneumatic supply.

**Reduced Carbon Footprint...** Low-bleed relay helps to conserve natural gas to reduce greenhouse gas emissions.

**Reduced Operating Costs, Increased Revenue...** Integral action relay with rugged metal seats requires less maintenance and provides more dependable liquid level control, which can improve uptime. Reduced emissions result in an increase in natural gas available to the sales line.

Figure 8. Fisher L2sj Liquid Level Controller



W9331




## Fisher 249 Sensors

249 sensors, in conjunction with either DLC3010/DLC3020f digital level controllers or 2500 controllers and transmitters, are designed to measure changes in liquid level, liquid interface level, or density/specific gravity inside a process vessel.

249 level sensors are available in both caged and cageless configurations, as shown in the table below. Caged sensors provide more stable operation than do cageless sensors for vessels with internal obstructions or considerable internal turbulence. Cageless sensors are generally used on applications requiring large displacers that are accommodated by large flange connections. Different displacer stem lengths permit lowering the displacer to the desired depth.

Refer to table 4, 5, 6, 7, 8, and 9 for product line capabilities and options.

Table 4. Fisher 249 Sensor Displacer Diameters, Sensor Connections, and Ratings

Sensor Type Number <sup>(1)</sup>	Pressure Rating	Connection Size	Connection Type
 <p><b>Caged Displacers<sup>(2)</sup></b> W8171</p>	249	CL125 or 250	NPS 1-1/2 or 2 Screwed or flanged
	249B 249BF	PN 10/40 or 63/100	NPS 2 Flanged
		PN 10/16, 25/40, or 63	DN 40 Flanged
		CL600	DN 50 NPT or socket-welding ends
		CL150, 300, or 600	NPS 1-1/2 or 2 Raised-face flanged or ring-type joint flanged
	249C	CL600	NPS 1-1/2 or 2 Screwed
		CL150, 300, or 600	NPS 1-1/2 NPS 2 Raised-face
	249K	CL1500	NPS 1-1/2 or 2 Raised-face flanged or ring-type joint flanged
249L	CL2500	NPS 2 (if a top connection is specified, it will be NPS 1 flanged) Ring-type joint flanged	
 <p><b>Top-Mounted Cageless Sensors<sup>(2)</sup></b> W8334-1</p>	249BP	CL150, 300, or 600	NPS 4 Raised-face flanged or ring-type joint flanged
	249CP	CL150 or 300	NPS 6 or 8 Raised-face flanged
		CL150, 300, or 600	NPS 3 Raised-face flanged
	249P	PN 10/16, 25/40, or 63 (Ratings to PN 250 also available)	DN 100 Flanged
		CL900 or 1500	NPS 4 Raised-face flanged or ring-type joint flanged
CL150 through 2500	NPS 6 or 8 Raised-face flanged		
 <p><b>Side-Mounted Cageless Sensors<sup>(2)</sup></b> W9354</p>	249VS	PN 10 to PN 160	NPS 4 Raised-face or flat-face
		CL125, 150, 250, 300, 900, or 1500	NPS 4 Raised-face or flat-face
		CL600, 900, or 2500	NPS 4 Butt weld end
 <p><b>Customer-Supplied Cage<sup>(2)</sup></b> W8678</p>	249W	PN 10/16, 25/40 Type B flange	DN 80 Raised-face flanged
		PN 25/40 Type B flange	DN 100
		CL150, 300, 600	NPS 3
			NPS 4

1. Not all sensor types are available in all world areas. Contact your Emerson Process Management sales office for information on sensor availability.  
2. 249 sensors may be mounted on either DLC3010/DLC3020f instruments, or 2500 controllers/transmitters.



Table 5. Fisher 249 Sensors Displacer Lengths

Sensor Type Number	Standard Displacer Length	
	mm	Inches
<b>Caged Displacers</b>	356 or 813	14 or 32
249		
249B, 249C, 249BF, 249K, 249L	356, 813, 1219, 1524, 1829, 2134, 2438, 2743, 3048	14, 32, 48, 60, 72, 84, 96, 108, 120
<b>Top-Mounted Cageless Sensors</b>		
249BP, 249CP, 249P		
<b>Side-Mounted Cageless Sensors</b>		
249VS		
<b>Top-Mounted or on Customer Supplied Cage</b>		
249W		

Table 6. Fisher 249 Sensor Construction Materials

Part	Type Number	Material	Notes
Cage, head, torque tube arm	249	Cast iron	For optional materials, and parts not shown, contact your Emerson Process Management sales office.
	249B, 249BF, and 249BP	Carbon steel	
	249C and 249CP	CF8M (316 stainless steel)	
	249K	Steel standard	
	249L	Steel standard	
	249P	Carbon Steel	
	249VS	LCC (steel), WCC (steel), CF8M	
Wafer body, torque tube arm	249W NPS 3 NPS 4	WCC, CF8M LCC, CF8M	
Standard Trim <sup>(1)</sup>	All	S31600	
Bolting	All	Steel grade B7 studs or cap screws and grade 2H nuts (standard),	

1. Trim parts include displacer rod, driver bearing; displacer stem parts, and stem connection parts.

Table 7. Fisher 249 Displacer and Torque Tube Materials

Part	Standard Material	Other Materials
Displacer	304 Stainless Steel 316 Stainless Steel for 249C, 249CP	316 Stainless Steel, N10276, N04400, Plastic, and Special Alloys
Displacer Stem, Driver Bearing, Displacer Rod and Driver	316 Stainless Steel	N10276, N04400, other Austenitic Stainless Steels, and Special Alloys
Torque Tube	N05500 <sup>(1)</sup> 316 SST for 249C, 249CP	316 Stainless Steels, N06600, N10276

1. N05500 is not recommended for spring applications above 232°C (450°F). Contact your Emerson Process Management sales office or application engineer if temperatures exceeding this limit are required.

Table 8. Maximum Unbuoyed Displacer Weight

Sensor Type	Torque Tube Wall Thickness	Displacer Weight W <sub>T</sub> (lb)
249, 249B, 249BF, 249BP, 249W	Thin	3.3
	Standard	5.0
	Heavy	9.5
249C, 249CP	Standard	4.0
	Heavy	6.4
249VS	Thin	3.0
	Standard	5.5
249L, 249P <sup>(1)</sup>	Thin	4.5
	Standard	8.5
249K	Thin	3.8
	Standard	7.3

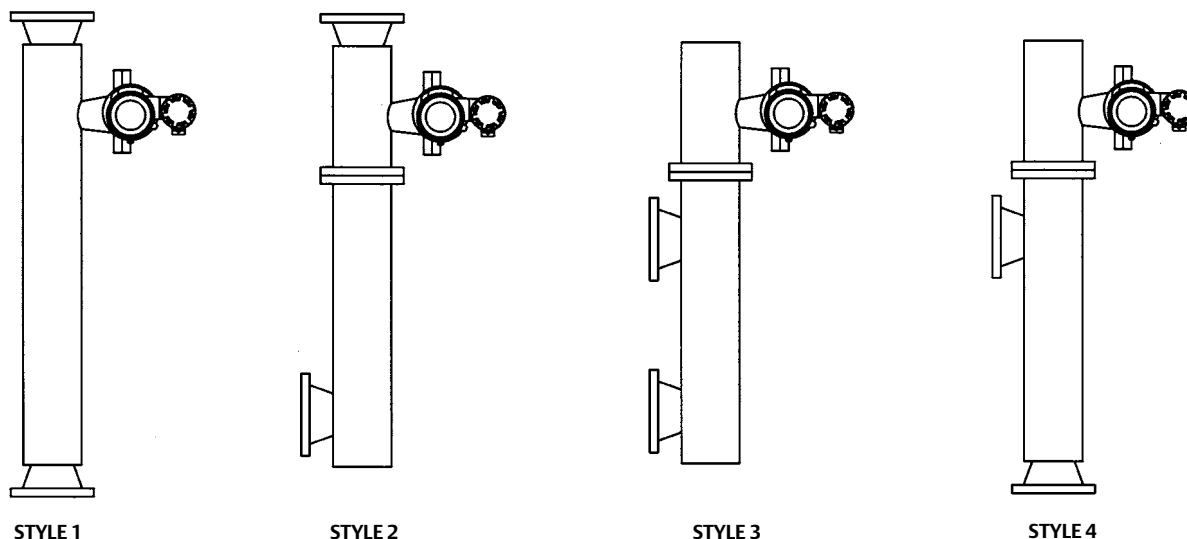
1. High pressure CL900 through 2500.

**Table 9. Temperatures**

Temperature	Type or Material	Temperature Capability		Notes
		°C	°F	
Ambient	DLC3010 / DLC3020f	-40 to 80	-40 to 176	For process temperatures below -29°C (-20°F) and for guidance on the need for a heat insulator, contact your Emerson Process Management sales office. If the ambient dew point is higher than the process temperature, ice might form and cause instrument malfunction and reduce insulator effectiveness.
	Standard 2500	-40 to 71	-40 to 160	
	High-temperature 2500	-18 to 104	0 to 220	
Process	Cast iron sensor parts	-29 to 232	-20 to 450	
	Steel sensor parts	-29 to 427	-20 to 800	
	Stainless steel sensor parts	-198 to 427	-325 to 800	
	N04400	-198 to 427	-325 to 800	
	Graphite/stainless steel gaskets	-198 to 427	-325 to 800	
Combination of ambient and process	N04400/PTFE gaskets	-73 to 204	-100 to 400	
	Some combinations of process and ambient temperatures within the above ranges require an optional heat insulator to protect the instrument from high or low temperatures. For example, an ambient temperature of 30°C or 86°F and a process temperature of 200°C or 392°F require a heat insulator.			

## Connection Styles and Positions

Figure 9. Cage Connection Styles (also see table 10)



Note:

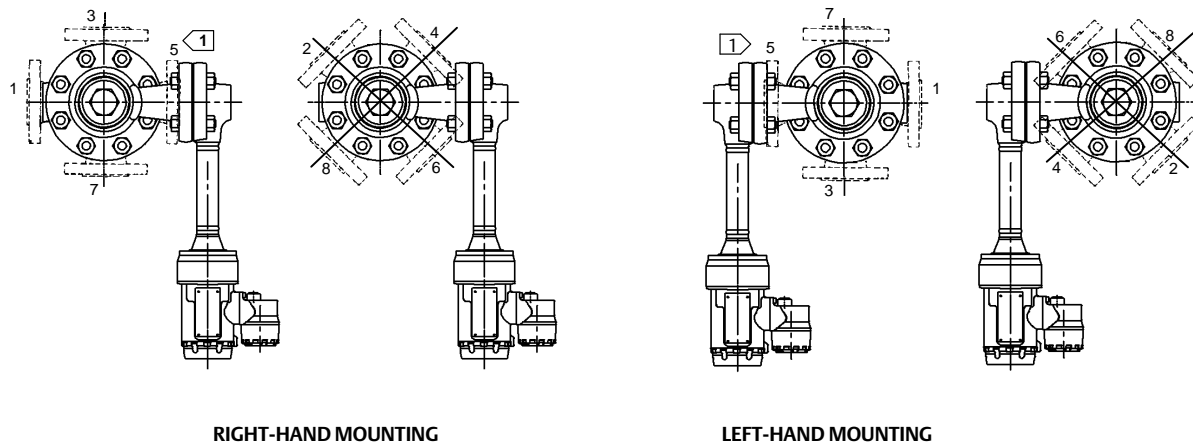
Cage connections shown illustrate the DLC3010/DLC3020f. Cage connections are also applicable to 2500 controllers/transmitters.

2885536-1  
B1820-2

**Table 10. Cage Connection Styles (also see figure 9)**

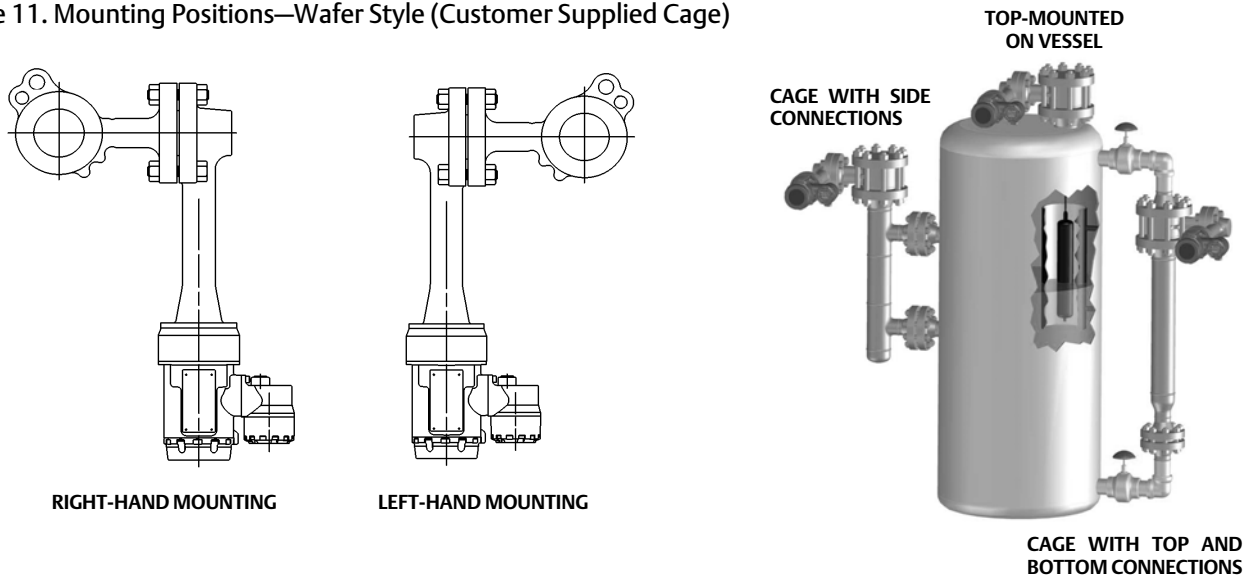
Connection Types:	S = Screwed F = Flanged SW = Socket welding			
Connection Locations:	Style 1	Style 2	Style 3	Style 4
	Top and bottom	Top and lower side	Upper side and lower side	Upper side and bottom
Example:	F-1 means flanged connections at the top and bottom of the cage.			

**Figure 10. Mounting Positions—Caged Displacers**



Note:  
Mounting positions shown illustrate the DLC3010/DLC3020f. Mounting positions are also applicable to 2500 controllers/transmitters.  
① Position 5 is not available for NPS 2 CL300 and 600 249C.

**Figure 11. Mounting Positions—Wafer Style (Customer Supplied Cage)**



Note:  
Mounting positions shown illustrate the DLC3010/DLC3020f. These positions are also applicable to 2500 controllers/transmitters.

## Pneumatic Liquid Level Instruments

Fisher 2500 controllers and transmitters (figures 12 and 13) are rugged, dependable, and simply constructed pneumatic instruments. In conjunction with a 249 sensor, they sense liquid level or interface level in a vessel, and produce a standard pneumatic output signal proportional to the process variable.

**Standard or Custom Configuration...** The 2500 controller in combination with a 249W sensor enables users to install pneumatic level controllers to a variety of industry standard or custom process vessel connections. The sensor consists of a wafer body, torque tube assembly and displacer and is rated for CL150, 300, and 600. The wafer body mounts between NPS 3 or 4 raised face flanges. Custom configurations

are also available to meet your specific application requirements. Refer to the 2500 specifications in tables 9, 11, 12, and 13, and the 249 specifications in tables 4, 5, 6, 7, 8, and 9.

**Easy Adjustment...** Simple dial-knobs make set point and proportional valve opening changes straightforward and easy.

**Simple, Durable Construction...** Few moving parts are used. Knife-edged driver bearing in sensor, and plated brass instrument case ball bearing for torque tube rotary shaft help provide low friction operation.

**Reduced Maintenance and Operating Costs...** Spring-out wire provides for in-service cleaning of relay orifice. Supply pressure conservation is enhanced because relay exhaust opens only when output pressure is being reduced.

Figure 12. Fisher 2500 Controller in Combination with a 249W Sensor— Installed in a Typical Customer-Supplied Cage



W8679

Table 11. Fisher 2500 Controller/Transmitter General Specifications

<b>Controller and Transmitter Selections<sup>(1)</sup></b>	<b>2500</b>	Proportional pneumatic controller	
	<b>2502</b>	Proportional-plus-reset pneumatic controller	
	<b>2502F</b>	Proportional-plus reset pneumatic controller with anti-reset windup	
	<b>2500T</b>	Proportional pneumatic transmitter	
	<b>2500S</b>	Differential gap (on-off) pneumatic controller with full adjustment	
	<b>2503</b>	Differential gap (on-off) pneumatic controller with limited adjustment	
<b>Process Sensor Range (Input Signal)</b>	Fluid level or fluid interface level	From 0 to 100 percent of displacer length <sup>(2)</sup> —standard lengths for all sensors are 356 mm (14 inches) or 813 mm (32 inches); other lengths available depending on sensor construction	
	Fluid density	From 0 to 100 percent of displacement force change obtained with given displacer volume—standard volumes are 1016 cm <sup>3</sup> (62 in <sup>3</sup> ) for 249C and 249CP sensors and 1622 or 1360 cm <sup>3</sup> (99 or 83 in <sup>3</sup> ) for most other sensors; other volumes available depending upon sensor construction	
<b>Allowable Specific Gravity (Standard)</b>	Fluid level or fluid interface level	2503 and 2503R: Specific gravity range, 0.25 to 1.10 All other types: Specific gravity range, 0.20 to 1.10	
	Fluid density	2503 and 2503R: Minimum change in specific gravity, 0.25 All other types: Minimum change in specific gravity, 0.20	
<b>Set Point Adjustment (Controllers only)</b>		Continuously adjustable to position control point or differential gap of less than 100 percent anywhere within displacer length (fluid or interface level) or displacement force change (density)	
<b>Zero Adjustment (Transmitters only)</b>		Continuously adjustable to position span of less than 100 percent anywhere within displacer length (fluid or interface level) or displacement force change (density)	
<b>Reset Adjustment (Proportional-Plus-Reset Controllers Only)</b>		Continuously adjustable from 0.005 to over 0.9 minutes per repeat (from 200 to under 1.1 repeats per minute)	
<b>Anti-Reset Differential Relief (2502F and 2502FR Controllers Only)</b>		Continuously adjustable from 0.14 to 0.48 bar (2 to 7 psi) differential to relieve excessive difference between proportional and reset pressures	
<b>Output Signal--Direct (Increasing Level Increases Output) or Reverse Action</b>	Proportional or reset controllers and transmitters	0.2 to 1.0 or 0.4 to 2.0 bar (3 to 15 or 6 to 30 psig)	
	Differential gap controllers with full adjustment	0 and 1.4 or 0 and 2.4 bar (0 and 20 or 0 and 35 psig)	
	Differential gap controllers with limited adjustment	0 and full supply pressure	
<b>Hazardous Area Classification</b>		2500 controllers/transmitters comply with the requirements of ATEX Group II Category 2 Gas and Dust 	
<b>Options</b>		Stainless steel heat insulator assembly Liquid level sight gauges Mechanical level indicator	
<p>1. Also refer to tables 4, 5, 6, and 7. 2. The torque tube and the displacer must be properly sized for the application in order for 0 to 100% of displacer length to be available.</p>			

Table 12. Fisher 2500 Controller/Transmitter Performance

<b>Independent Linearity (Transmitters Only)</b>	1 percent of output pressure change at span of 100 percent
<b>Hysteresis</b>	0.6 percent of output pressure change at 100 percent of proportional band, differential gap, or span
<b>Repeatability</b>	0.2 percent of displacer length or displacement force change
<b>Deadband (Except Differential Gap Controllers)</b>	0.05 percent of proportional band or span
<b>Typical Frequency Response</b>	4 Hz and 90-degree phase shift at 100 percent of proportional band, differential gap, or span with output pipe to typical instrument bellows using 6.1 meters (20 feet) of 6.3 mm (1/4-inch) tubing

**Table 13. Fisher 2500 Controller/Transmitter Supply Pressure**

Output Signal	Standard Supply and Output Pressure Gauge Indications <sup>(1)</sup>	Normal Operating Supply Pressure <sup>(2)</sup>		Air Consumption at Normal Operating Supply Pressure <sup>(3)</sup>			
				Normal m <sup>3</sup> /h <sup>(4)</sup>		Scfh <sup>(4)</sup>	
		Bar	Psig	Min <sup>(5)</sup>	Max <sup>(6)</sup>	Min <sup>(5)</sup>	Max <sup>(6)</sup>
0.2 to 1.0 bar (3 to 15 psig), except 0 and 1.4 bar (0 and 20 psig) <sup>(2)</sup> for on-off controllers	0 to 30 psig	1.4	20	0.11	0.72	4.2	27
0.4 to 2.0 bar (6 to 30 psig), except 0 and 2.4 bar (0 and 35 psig) <sup>(2)</sup> for on-off controllers	0 to 60 psig	2.4	35	0.19	1.1	7	42

1. Consult your Emerson Process Management sales office about gauges in other units.  
 2. Control and stability may be impaired if this pressure is exceeded (except 2503 or 2503R controller without proportional valve).  
 3. Except 2503 or 2503R controller, which bleeds only when relay is open at exhaust position.  
 4. Normal m<sup>3</sup>/hr=normal cubic meters per hour at 0°C and 1.01325 bar. Scfh=standard cubic foot per hour at 60°F and 14.7 psia.  
 5. At zero or maximum proportional band or span setting.  
 6. At setting in middle of proportional band or span range.

**Figure 13. Typical Controller**



## Related Documents

Other documents containing information related to level instruments include:

- [FIELDVUE DLC3010 Digital Level Controller \(Bulletin 11.2:DLC3010\) \(D102727X012\)](#)
- [FIELDVUE DLC3020f Digital Level Controller \(Bulletin 11.2:DLC3020f\) \(D103433X012\)](#)
- [Fisher 2100 Pneumatic and 2100E Electric Liquid Level Switches \(Bulletin 32.2:2100\) \(D200032X012\)](#)
- [Fisher L2 Liquid Level Controller \(Bulletin 34.2:L2\) \(D103034X012\)](#)
- [Fisher L2e Electric Level Controller \(Bulletin 34.2:L2e\) \(D103532X012\)](#)
- [Fisher L2sj Liquid Level Controller \(Bulletin 34.2:L2sj\) \(D103229X012\)](#)
- [Fisher 2500-249 Pneumatic Controllers and Transmitters \(Bulletin 34.2:2500\) \(D200037X012\)](#)
- [Fisher 249 Sensor, Level Controller, and Transmitter Dimensions \(Bulletin 34.2:249\) \(D200039X012\)](#)

These documents are available from your Emerson Process Management sales office. Also visit our website at [www.Fisher.com](http://www.Fisher.com).

Neither Emerson, Emerson Process Management, nor any of their affiliated entities assumes responsibility for the selection, use or maintenance of any product. Responsibility for proper selection, use, and maintenance of any product remains solely with the purchaser and end user.

Fisher, FIELDVUE, and easy-Drive are marks owned by one of the companies in the Emerson Process Management business unit of Emerson Electric Co. Emerson Process Management, Emerson, and the Emerson logo are trademarks and service marks of Emerson Electric Co. All other marks are the property of their respective owners.

The contents of this publication are presented for informational purposes only, and while every effort has been made to ensure their accuracy, they are not to be construed as warranties or guarantees, express or implied, regarding the products or services described herein or their use or applicability. All sales are governed by our terms and conditions, which are available upon request. We reserve the right to modify or improve the designs or specifications of such products at any time without notice.

**Emerson Process Management**  
Marshalltown, Iowa 50158 USA  
Sorocaba, 18087 Brazil  
Chatham, Kent ME4 4QZ UK  
Dubai, United Arab Emirates  
Singapore 128461 Singapore

[www.Fisher.com](http://www.Fisher.com)