Introduction

Features & Benefits

- The need for only one wire pair to communicate with the control room reduces wiring costs
- Combines multiple loop components in a single package for reduced hardware and maintenance costs
- Improves loop accuracy by using digital technology and by eliminating data communication errors among multiple components.
- The ability to communicate with the controller from a remote, central location improves operations
- Implementation of the HART® communication protocol facilitates use with many control system devices
- Factory Configured Options (FCOs) reduce configuration time for standard control strategies
- Flexible input options accommodate existing I/O

Description

The FIELDPAC 348 Field-Mounted Controller supports advanced single-loop control applications, while reducing installed costs. The FIELDPAC controller lowers hardware costs by providing multiple loop components in one package and decreases wiring costs by reducing to one the number of wire pairs needed to transmit data to a central control room.

The loop components integrated within the FIELDPAC controller are based on the proven technology of several other instruments, including the Siemens Controllers, pressure transmitters, and I/P and P/I converters. This combination allows the FIELDPAC controller to provide an innovative, reliable controller that can be mounted directly at the process site.

The FIELDPAC controller includes a TYPE 4X (IP65) enclosure and a hazardous area design (intrinsically safe and non-incendive) to allow installation at the process site. It offers several choices of direct process inputs, optional pneumatic or thermocouple/RTD inputs, and an optional pneumatic output, all of which are in addition to the standard complement of 4-20 mA inputs and discrete I/O.

The FIELDPAC controller also minimizes wiring costs via the HART protocol. With HART digital signal, the FIELDPAC controller transmits process data to a control room over one standard wire pair, instead of the three to four wire pairs required by a typical loop. Using HART also allows the FIELDPAC controller to communicate with many other devices, because HART has the largest base of any field communications protocol.

The FIELDPAC controller accommodates control strategies ranging from basic PID control to sophisticated loops, such as ratio, bias, single-station cascade, dual-loop and feed-forward control. Circuits are configured via the same function block technique employed with the Model 353 Process Automation Controller, where the user simply selects the desired blocks, connects them, and sets parameters, such as gains and timer values. Moreover, the FIELDPAC controller provides over 60 pre-configured function blocks containing more than 200 functions.

In addition, the FIELDPAC controller provides many pre-configured control strategies (FCOs). Each FCO can be used as is, or customized as needed, significantly reducing configuration time for standard control requirements.

The FIELDPAC controller is configured locally or at a remote PC. The station's pushbuttons allow the FIELDPAC controller to be configured at the faceplate.
## Specifications

### Electrical

**DC Power Supply (348D)**
- Input: $V_{PS} = 14.0-28.0$ Vdc
- Power: Consumption: 4.4 Watts (max.)

**AC Power Supply (348EA)**
- Input: 90-264 Vac, 47 to 63 Hz
- Voltage Selection: Auto-sensing
- Power Consumption: 32 VA

**2-Wire Transmitter Power (348E)**
- Voltage: DC-Powered: 4.5 V less than $V_{PS}$
- AC-Powered: 22 Vdc (nominal)
- Current: 80 mA (max.), short circuit protected

### Heat Dissipation

- DC-Powered: 3.5 BTU/hr.
- AC-Powered: 4.6 BTU/hr.

### Mounting

- Type: Panel, 2” Pipe, or Wall
- Panel Cutout: 11.5” H x 10.0” W, ±0.1
  292 mm H x 254 mm W, ±2.5 mm

### Environmental

#### Hazardous Area Classification

- 348S: Intrinsically Safe
  - CSA Class I; Division 1; Groups C, D
  - CSA Class II; Division 1; Groups E, F, G
  - CSA Class III; Division 1

- 348E: FM/CSA Class I; Division 2; Groups A, B, C & D

#### Ambient Temperature Range

- -40 to 85°C (-40 to 185°F)

#### Humidity

- 0 to 100%

#### ESD Susceptibility

- 15,000 volts discharged to case and keyboard
- 5,000 volts to any terminal connection

### Surge Protection

- ANSI/IEEE C37.90, 1.5 kV

### Inputs

#### Analog Inputs

- Standard Calibration: 1 to 5 Vdc
- Zero: 0 to 1 Vdc
- Span: 4 to 5 Vdc
- Input Impedance: > 1 megohm
- Type: Single-ended (non-isolated)
- Normal Mode Rejection: -64 dB @ 60 Hz
- Maximum Continuous Input: ±30 Vdc
- Accuracy: < ±0.85 % per 50°C

#### Digital Inputs

- Logic “1” (ON): 12 to 30 Vdc
- Logic “0” (OFF): 0 to 5 Vdc
- Type: Opto-coupled (isolated)
- Input Impedance: 3300 ohms

### Outputs

#### Analog Outputs

- Standard Calibration: 4 to 20 mA
- Accuracy: < ±0.1% of span
- AC Power: < 680W
- Signal Reference: Negative terminal is controller common
- Temperature Effect: ±0.5% per 50°C

#### Discrete Outputs

- Type: Open collector transistor (emitter tied to controller common)
- Load Voltage: 30 Vdc (max.)
- Load Current: 100 mA (max.)
- “ON” Voltage: 0.9V @ 100 mA
- “OFF” Leakage: 0.5 uA @ 30 Vdc

#### Isolated Discrete Outputs

- Type: Opto Transistor
- Load Voltage: 30 Vdc (max.)
- Load Current: 50 mA (max.)
- “ON” Voltage: 5.0 V @ 20 mA; 0.5 V @ 2 mA
- “OFF” Leakage: 2.0 mA @ 30 Vdc

#### Relay Outputs

- Type: Epoxy sealed
- Switch: SPDT (Form C)
- Rating: 3A @ 250 Vac

### Pneumatic Inputs (Optional)

- 15 PSIG (103 kPa) Sensor:
  - Standard Calibration: 3 to 15 psig (20.7 kPa to 103 kPa)
  - Zero: 0 to 4 psig (0 to 27.6 kPa)
  - Span: 12 to 15 psig (82.7 kPa to 103 kPa)

- 30 PSIG (207 kPa) Sensor:
  - Zero: 0 to 8 psig (0 to 55.1 kPa)
  - Span: 24 to 30 Psig (165 kPa to 207 kPa)

### Temperature Effect

- ±0.35% of span
- ±0.06% per °C

### Input Types

- Thermocouple: R, S, T, B, J, K, E, N
- RTD: DIN: $a = 0.003850W/oC$
- US: $a = 0.003920W/oC$
- 100, 200 & 500 W available

### Pneumatic Inputs (Optional)

- mV Wide: Zero: -15 to 100 mVdc
- Span: 5 to 115 mVdc
- mV Narrow: Zero: -10 to 25 mVdc
- Span: 1 to 35 mVdc
- Input Impedance: > 1 megohm

### Direct Process Pressure (Optional)

- Types: Gauge, Differential, Absolute
- See information on direct process pressure input, page 2.21

### Additional Notes

- See page 2.21 for detailed information on direct process pressure inputs.

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**Technical data**

**Controllers**

**FIELDPAC™ 348 Field-Mounted Controller**

2.19
**Controllers**

**FIELDPAC™ 348 Field-Mounted Controller**

**Function Blocks**

Control strategies within the FIELDpac controller are designed using the following function blocks, which are stored in memory. The blocks are used by assigning an execution sequence number to each block.

<table>
<thead>
<tr>
<th>Type</th>
<th>Description</th>
<th>Qty., 348S</th>
<th>Qty., 348E</th>
<th>Std./Opt.</th>
</tr>
</thead>
<tbody>
<tr>
<td>Input</td>
<td>Analog Input (1-5 Vdc)</td>
<td>3</td>
<td>3</td>
<td>S</td>
</tr>
<tr>
<td></td>
<td>Discrete Input</td>
<td>2</td>
<td>2</td>
<td>S</td>
</tr>
<tr>
<td></td>
<td>Pneumatic Input</td>
<td>1/3</td>
<td>1/3</td>
<td>O</td>
</tr>
<tr>
<td></td>
<td>Process Pressure Input</td>
<td>1</td>
<td>1</td>
<td>O</td>
</tr>
<tr>
<td></td>
<td>Thermocouple/RTD/mV Input</td>
<td>1</td>
<td>1</td>
<td>O</td>
</tr>
<tr>
<td>Output</td>
<td>Analog Output (4-20 mAdc)</td>
<td>2</td>
<td>2</td>
<td>S</td>
</tr>
<tr>
<td></td>
<td>Discrete Output</td>
<td>2</td>
<td>2</td>
<td>S</td>
</tr>
<tr>
<td></td>
<td>Isolated Discrete Output</td>
<td>2</td>
<td>2</td>
<td>S</td>
</tr>
<tr>
<td></td>
<td>Isolated Relay Output</td>
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</tr>
<tr>
<td></td>
<td>Pulse Integrator Output</td>
<td>1</td>
<td>1</td>
<td>S</td>
</tr>
<tr>
<td></td>
<td>Pneumatic Output (3-15/3-27 PSI)</td>
<td>1</td>
<td>1</td>
<td>O</td>
</tr>
<tr>
<td>Control</td>
<td>Ratio</td>
<td>1</td>
<td>1</td>
<td>S</td>
</tr>
<tr>
<td></td>
<td>Bias</td>
<td>1</td>
<td>1</td>
<td>S</td>
</tr>
<tr>
<td></td>
<td>HI/LO Setpoint Limit</td>
<td>2</td>
<td>2</td>
<td>S</td>
</tr>
<tr>
<td></td>
<td>Override Selector</td>
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<td>1</td>
<td>S</td>
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<tr>
<td></td>
<td>Pushbutton Transfer Switch</td>
<td>2</td>
<td>2</td>
<td>S</td>
</tr>
<tr>
<td></td>
<td>Process Alarms</td>
<td>2</td>
<td>2</td>
<td>S</td>
</tr>
<tr>
<td></td>
<td>Controller (PID, IO, PD, PIDAG)</td>
<td>2</td>
<td>2</td>
<td>S</td>
</tr>
<tr>
<td></td>
<td>Auto/Manual Transfer</td>
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<td>2</td>
<td>S</td>
</tr>
<tr>
<td></td>
<td>Integrator/Totalizer</td>
<td>1</td>
<td>1</td>
<td>S</td>
</tr>
<tr>
<td></td>
<td>Setpoint Track &amp; Hold</td>
<td>2</td>
<td>2</td>
<td>S</td>
</tr>
<tr>
<td></td>
<td>General -Purpose Track &amp; Hold</td>
<td>1</td>
<td>1</td>
<td>S</td>
</tr>
<tr>
<td></td>
<td>General-Purpose Hold</td>
<td>1</td>
<td>1</td>
<td>S</td>
</tr>
<tr>
<td></td>
<td>Logic (AND, NAND, OR, NOR, XOR)</td>
<td>9</td>
<td>9</td>
<td>S</td>
</tr>
<tr>
<td></td>
<td>Deviation Amplifier</td>
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<td>S</td>
</tr>
<tr>
<td></td>
<td>Square Root Extractor</td>
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<td>1</td>
<td>S</td>
</tr>
<tr>
<td></td>
<td>Pulse Integrator</td>
<td>1</td>
<td>1</td>
<td>S</td>
</tr>
<tr>
<td></td>
<td>Math (add, subtract, multiply, divide)</td>
<td>3</td>
<td>3</td>
<td>S</td>
</tr>
<tr>
<td></td>
<td>Gain &amp; Bias</td>
<td>2</td>
<td>2</td>
<td>S</td>
</tr>
<tr>
<td></td>
<td>Lead</td>
<td>1</td>
<td>1</td>
<td>S</td>
</tr>
<tr>
<td></td>
<td>Rate Limiter</td>
<td>1</td>
<td>1</td>
<td>S</td>
</tr>
<tr>
<td></td>
<td>Dead Time Table</td>
<td>1</td>
<td>1</td>
<td>S</td>
</tr>
<tr>
<td></td>
<td>10-Segment Characterizer</td>
<td>2</td>
<td>2</td>
<td>S</td>
</tr>
<tr>
<td></td>
<td>Repeat Cycle Timer</td>
<td>1</td>
<td>1</td>
<td>S</td>
</tr>
<tr>
<td></td>
<td>General-Purpose Transfer</td>
<td>1</td>
<td>1</td>
<td>S</td>
</tr>
<tr>
<td></td>
<td>Batch Switch</td>
<td>1</td>
<td>1</td>
<td>S</td>
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<tr>
<td></td>
<td>Quad Comparator</td>
<td>1</td>
<td>1</td>
<td>S</td>
</tr>
<tr>
<td></td>
<td>Delay Timer</td>
<td>1</td>
<td>1</td>
<td>S</td>
</tr>
<tr>
<td></td>
<td>One Shot Timer</td>
<td>1</td>
<td>1</td>
<td>S</td>
</tr>
<tr>
<td></td>
<td>Dual Transfer Switch</td>
<td>1</td>
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<td>S</td>
</tr>
<tr>
<td>Operation</td>
<td>Operator Display</td>
<td>1</td>
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<td>S</td>
</tr>
<tr>
<td></td>
<td>Password Security</td>
<td>1</td>
<td>1</td>
<td>S</td>
</tr>
<tr>
<td></td>
<td>HART Interface</td>
<td>1</td>
<td>1</td>
<td>S</td>
</tr>
</tbody>
</table>

1) Analog input #1 is not available when the option for (1) or (3) pneumatic inputs is used, and analog input #3 is not available when the option for (3) pneumatic inputs is used.

2) Analog output #1 is used to drive the I/P output and is not available as a current output when the pneumatic output option is used.

3) Model 348E only.

4) Refer to the information on direct process pressure input on page 2.21 for the model number used to specify sensor options. For example, the differential pressure version of the “Direct Connect” output option (D) of each model number is used to indicate a FIELDpac application.

5) Other agency approvals pending.

6) Approved intrinsic safety barriers are required for Div.1 installations.

---

**Model Number**

**Intrinsically Safe Field-Mounted Controller**

**Non-Incendive Field-Mounted Controller**

**Power Supply**

- 90-264 Vac, 47-63 Hz³
- 90-264 Vac, 47-63 Hz³ (CE Compliant)
- 14-28 Vdc, non-isolated

**Operator’s Display**

- Full-Function
- Full-Function with Backlight³

**Process Pressure Input**

- Direct-Connected D/P Sensor⁴
- Direct-Connected Pressure Sensor³ (gauge & absolute)
- Removable plug for future sensor mounting
- Not Required

**Analogue Output No.1 Options**

- 4-20 mA Current
- 15 PSIG Pneumatic
- 30 PSIG Pneumatic

**Design Level**

- Current Design

**Communications**

- HART

**Electrical Connections**

- 1/4 NPT
- 1.5 Metric

**Hazardous Area Classifications⁵**

- FM/CSA Class I, Div.2; Groups A, B, C & D
- CSA Class I; Div.1; Groups C & D
- BASEEFA TypeN
- CE Compliant
- Not Required

---

<table>
<thead>
<tr>
<th>Order No.</th>
<th>Qty., 348S</th>
<th>Qty., 348E</th>
<th>Std./Opt.</th>
</tr>
</thead>
<tbody>
<tr>
<td>348S-</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>348E-</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

---

**Notes:**

- Not Required
- CE Compliant
- BASEEFA TypeN
- CSA Class I; Div.1; Groups A, B, C & D
- FM/CSA Class I; Div.2; Groups A, B, C & D
- 1.5 Metric
- 1/4 NPT
- HART
- 30 PSIG Pneumatic
- 15 PSIG Pneumatic
- Current Design
- No Modifications
- Reserved
- Reserved
- 1/4 NPT
- 1.5 Metric
- FM/CSA Class I, Div.2; Groups A, B, C & D
- CSA Class I; Div.1; Groups C & D
- BASEEFA TypeN
- CE Compliant
- Not Required

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2.20
Standard Configurations

The most common types of control have been configured at the factory and stored in the FIELDPAC controller’s memory. These control strategies, called FCOs, can be easily recalled from memory and used as is or modified to meet individual requirements. They include:

- Single-loop PID controller
- External-set PID controller
- Ratio-set PID controller
- Cascade controller
- Dual-loop controller

Accessories

- FIELDPAC Configuration Software (P/N 15939-48Vx.xx) - PC-based software package for configuring the FIELDPAC controller (DOS-based).
- Resistor Kit (P/N 16161-111) – For use with 4-20 mA inputs (250W).
- Permanent Instrument Tag – The instrument name-plate can be stamped with up to three lines of text (at up to 30 characters per line).
- Extended Mounting Bracket (P/N 16161-88) – Provides additional room for mounting. Order 2 when wall mounting a FIELDPAC unit with direct-connected D/P sensor or when pipe-mounting a FIELDPAC unit with a three-valve manifold and a D/P sensor. Should not be used in an area with excessive vibration.
- Mounting Bracket (P/N 16161-197)
- Hart Modem (P/N 16275-235) – The Hart modem is a Bell 202T style modem for use with the PC configuration software package.
- 24 V ac/dc Barrier/Supply Kit (P/N 16161-140 Stahl 9381/10-158-160-10) – This approved barrier/supply combination powers the Model 348S when installed in Div. 1, Class1, Groups C, & D; Class II, Groups E, F & G; and Class III areas. The barrier/supply converts its nominal 24 Vac/dc input into an approved, barrier protected 15 Vdc power source for the Model 348S.
- 120/240 Vac Barrier/Supply Kit (P/N 16161-141 Stahl 9381/10-158-160-50) – This approved barrier/supply combination powers the Model 348S when installed in Div. 1, Class 1, Groups C & D; Class II, Groups E, F & G; and Class III areas. The barrier/supply converts its nominal 120/240 Vac input into an approved, barrier protected 15 Vdc power source for the Model 348S.
- Hart Signal Barrier Kit (P/N 16161-142 Stahl 9001/02/-016-015-10) – This approved barrier conditions Hart signals passing to the Model 348S when installed in Div. 1, Class 1, Groups C, & D; Class II; Groups E, F, & G; and Class III areas.

1) “x.xx” specifies the software’s version number. This will be defined by Siemens as the latest version number.
Controllers
FIELDPAC™ 348 Field-Mounted Controller

Dimensions

Panel Cutout: 11.5± 0.1 (292±2.5) High X 10.0±0.1 (254±2.5) Wide
Panel Thickness: 3/16” (4.76) maximum
Except for panel cutout, all dimensions are nominal and for reference only.
The FIELDPAC controller with a pressure sensor must mount on a panel or pipe.