**Features**

- Displays actual temperature and measuring unit.
- Very large 26mm (1”) digits.
- Piegraph indication: ten segments.
- Number of digits for temperature: 5½.
- Selectable on-screen engineering units: °C-°F-K.
- Operational temperature -40°C up to +80°C (-40°F up to 178°F).
- Very compact design for panel mount, wall mount or field mount applications.
- Auto backup of all settings.
- Rugged aluminum field mount enclosure IP67/NEMA4X.
- Intrinsically Safe - ATEX, IECEx and CSA approval for gas and dust applications.
- Explosion/flame proof II 2 GD EEx d IIB T5.
- LED backlight option.
- Loop or battery powered, 8 - 24V AC/DC or 115 - 230V AC power supply.
- Sensor supply 8.2 / 12 / 24V DC.

**Signal input**

**Temperature**

- PT100 - 2, 3 or 4 wire.
- (0)4 - 20mA.
- 0 - 10V DC.

**Applications**

- Applications where a basic temperature measurement display is required without temperature monitoring. More sophisticated models: F043, F140 and F143.
**General information**

**Introduction**
The F040 is a straightforward temperature indicator, displaying the actual value with its measuring unit. The display is typically used as a battery powered indicator for PT100 temperature sensors but also often used with (0) 4 - 20mA input signals. The measuring unit to be displayed is simply selected through an alfa-numerical configuration menu. No adhesive labels have to be put on the outside of the enclosure: a weather proof and user friendly solution!

The configuration of the Span, off-set and number of decimals is done through software functions, without any sensitive dip-switches or trimmers. A wide selection of options further enhance this models capabilities, including Intrinsically Safe for hazardous area applications.

**Display**
The display has very large 26mm (1”) digits which displays the temperature and measuring unit. As the F040 has been designed for field mounted applications, a smart display update function has been incorporated: related to the lower ambient temperature, the update frequency of the LCD is tuned automatically to achieve a readable display even at -40°C / -40°F.

**Backlight**
For those applications where readability during day and night is an issue, a bi-color backlight is available. The background color green or amber and the intensity can be adjusted from the keyboard. The display is a transflective type, which means that a high contrast reading is guaranteed in full sunlight as well as during the night. This backlight option is also available Intrinsically Safe.

**Configuration**
All configuration settings are accessed via a simple operator menu which can be pass-code protected. Each setting is clearly indicated with an alphanumerical description, therefore avoiding confusing abbreviations. All settings are safely stored in EEPROM memory in the event of sudden power failure.

**Signal input**
The F040 does accept (0) 4 - 20mA and 0 - 10V input signals from any type of temperature measurement device. Also a two, three or four wire PT100 sensor can be used. Thermocouple inputs are in preparation.

**Power supply**
Several power supply options are available to power the F040 and sensor. A battery powered version with a long life lithium battery which will last up to five years. A 4 - 20mA input loop powered version is available as well. A real sensor supply is offered with the 24V AC/DC or 115 - 230V AC power supply option.

**Hazardous area**
For hazardous area applications, this model has been ATEX, IECEx and CSA certified Intrinsically Safe for gas and dust applications, with an allowed operational temperature of -40°C to +70°C (-40°F to +158°F). FM certification is expected to be available in 2009. A flame proof enclosure with ATEX certification offers the rating II 2 GD Ex d IIB T5.

**Enclosures**
Various types of enclosures can be selected, all ATEX, IECEx and CSA approved. As standard the F040 is supplied in an GRP panel mount enclosure, which can be converted to an IP67 / NEMA 4X GRP field mount enclosure by the addition of a back case. Most popular is our rugged aluminum field mount enclosure with IP67 / NEMA 4X rating. Both European or U.S. cable gland entry threads are available.

**Overview application F040**

---

**Fluidwell**

---

2 F040
**Typical wiring diagram F040-T-PB**

Type PB: BATTERY POWERED

- Backlight option: type ZB
  - 20 - 30V DC
  - (not used in this example)
- Power supply type PX:
  - 8 - 30V DC
  - (not used in this example)
- Temperature sensor
  - type T: PT100

Sensor supply: not available.

**Typical wiring diagram F040-T-PX-ZB**

Type PB: BATTERY POWERED

- Backlight option: type ZB
  - 20 - 30V DC
- Main supply
  - 8 - 30V DC
- Power supply type PX:
  - 8 - 30V DC
- Common ground
- Temperature sensor
  - type T: PT100

Sensor supply: not available.

**Typical wiring diagram F040-A-PX-ZB**

Type PX: BATTERY POWERED

- Backlight option: type ZB
  - 20 - 30V DC
- Main supply
  - 8 - 30V DC
- Power supply type PX:
  - 8 - 30V DC
- Common ground
- Temperature sensor
  - type T: PT100

**Typical wiring diagram F040-A-PL-ZB**

Type PL: INPUT LOOP POWERED

- Backlight option: type ZB
  - 20 - 30V DC
- Common ground
- Temperature input type A - PL:
  - Input loop powered 4 - 20mA
- Sensor supply: sensor is externally powered.

* Sensor supply voltage:
  - Terminal 3: not available.
**Typical wiring diagram F040-A-PD-ZB**

**Typical wiring diagram F040-A-PF-ZB**

**Typical wiring diagram F040-A-PM-ZB**

**Typical wiring diagram F040-T-PM-ZB**

---

**TERMINAL CONNECTORS**

**F0 - series**

**Type PD:**

16 - 30V DC POWER SUPPLY

- Backlight option: type ZB
  - 20 - 30V DC

- Main supply
- Common ground

**Type PF:**

24V AC / DC POWER SUPPLY

- Backlight option: type ZB
  - Internally powered.

**Type PM:**

115 - 230V AC POWER SUPPLY

- Backlight option: type ZB
  - Internally powered.

**Type PM:**

115 - 230V AC POWER SUPPLY

- Power supply type PM:
  - 115 - 230V AC

---

**Circuit depends on type of signal**

**Sensor supply type PD:**

16 - 30V DC

**Sensor supply type PF:**

24V AC / DC

**Supply type PM:**

115 - 230V AC

---

**Sensor supply voltage:**

Terminal 7: 8.2 / 12 / 24V DC.

---

* Sensor supply voltage:
  - Terminal 2: not available.
  - Terminal 6 with type PD: voltage as connected to terminal 5 (internally linked).

Please note:

- For type PD:
  - Power supply type PD:
    - 16 - 30V DC

- For type PF:
  - Power supply type PF:
    - 24V AC / DC

- For type PM:
  - Power supply type PM:
    - 115 - 230V AC

---

**Temperature input type A:**

(0)4 - 20mA

- For type PF:
  - Sensor supply voltage:
    - Terminal 3: not available.
    - Terminal 6 with type PD: voltage as connected to terminal 5 (internally linked).

---

* Sensor supply voltage:
  - Terminal 7: 8.2 / 12 / 24V DC.

---

**Warning:**

* Sensor supply voltage:
  - Terminal 7: not available.
Hazardous area applications

The F040-XI has been certified according ATEX and IECEx by KEMA and according CSA c-us for use in Intrinsically Safe applications with an ambient temperature of -40°C to +70°C (-40°F to +158°F).

- The ATEX markings for gas and dust applications are:
  
  ![ATEX Markings](image)

  - II 1 G Ex ia IIC T4
  - II 1 D Ex iaD 20 IP 65/67 T 100 °C.

- The IECEx markings for gas and dust applications are:
  
  ![IECEx Markings](image)

  - Ga Ex ia IIC T4
  - Ex iaD 20 IP 65/67 T100 °C.

- The CSA c-us markings are:
  
  ![CSA c-us Markings](image)

  - Class I/II/III, Division 1, Groups A, B, C, D, E, F, G, Temperature class T4 and Class I, Zone 0, AEx ia IIC T4.
  - FM approval is expected to become available in 2009.

It is allowed to connect up to three I.S. power supplies to power the unit, sensor and backlight. The F040-PD-XI offers the input voltage to power an analog sensor.

An ATEX approved flame proof enclosure with rating II 2 GD EEx d IIB T5 is available as well. Please contact your supplier for further details.

Certificate of conformity KEMA 05ATEX1168 X
- IECEx KEM 08.0006X • CSA.08.2059461 X

Configuration example IIA - IIB and IIC - F040-T-PC-XI - Battery powered unit

<table>
<thead>
<tr>
<th>TERMINAL CONNECTORS</th>
<th>HAZARDOUS AREA</th>
<th>SAFE AREA</th>
</tr>
</thead>
<tbody>
<tr>
<td>F0 - series</td>
<td></td>
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</tr>
<tr>
<td>1</td>
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</tbody>
</table>

- Power supply type PX: 8 - 30V DC (Not used in this example).
- Backlight option: type ZB (Not used in this example).
- Temperature sensor type T: PT100

* Sensor supply voltage for analog temperature sensor type A / U: not available in this example.

Please note: type PX may be used in combination with the battery (type PC). PX will power the unit; the battery will be disabled automatically if power is disconnected.
Configuration example IIA - IIB and IIC - F040-A-PD-XI-ZB - Power supply 16 - 30V DC

**TERMINAL CONNECTORS**

<table>
<thead>
<tr>
<th>Common ground</th>
<th>+</th>
<th>Power supply</th>
</tr>
</thead>
<tbody>
<tr>
<td>Supply</td>
<td></td>
<td></td>
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<tr>
<td>Main supply</td>
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<tr>
<td>Signal</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

**HAZARDOUS AREA**

- Backlight option: type ZB
- I.S. temperature sensor - input type A: (0)4 - 20mA

**SAFE AREA**

- Supply type PD: 16 - 30V DC
- Power supply

Note: above values are safety values. Consult the technical specification for operational values.

* Sensor supply voltage for analog temperature sensor type A / U: Terminal 6: as input voltage terminal 5 (internally linked).

Please note: type PD may be used in combination with the battery (type PC). PD will power the unit; the battery will be disabled automatically till power is disconnected.

---

Configuration example IIA - IIB and IIC - F040-A-PL-XI-ZB - Input loop powered

**TERMINAL CONNECTORS**

<table>
<thead>
<tr>
<th>Common ground</th>
<th>+</th>
<th>Power supply</th>
</tr>
</thead>
<tbody>
<tr>
<td>Supply</td>
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<td>Main supply</td>
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<tr>
<td>Signal</td>
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</tbody>
</table>

**HAZARDOUS AREA**

- Backlight option: type ZB
- I.S. temperature sensor - input type A: (0)4 - 20mA input loop powered

**SAFE AREA**

- Supply type ZB: 4 - 20mA input loop powered
- Power supply

Note: above values are safety values. Consult the technical specification for operational values.

Sensor supply is not available: unit is input loop powered (type PL).

Please note: type PL may be used in combination with the battery (type PC). PL will power the unit; the battery will be disabled automatically till power is disconnected.
## Technical specification

### Display

- **Type**: High intensity reflective numeric and alphanumeric LCD, UV-resistant.
- **Dimensions**: 90 x 40mm (3.5” x 1.6”).
- **Digits**: 5½ very large 26mm (1”) digits. Various symbols and measuring units.
- **Piegraph**: Ten segments - related to the input signal.
- **Refresh rate**: User definable: 8 times/sec. / 1 / 3 / 15 / 30 secs / off.
- **Option ZB**: Transflective LCD with bi-color LED-backlight; green / amber. Intensity and color selected through the keyboard. Good readings in full sunlight and darkness. Also available Intrinsically Safe.

### Operating temperature

- **Standard unit**: -40°C to +80°C (-40°F to +178°F).
- **Intrinsically Safe**: -40°C to +70°C (-40°F to +158°F).

### Power requirements

- **Type PB**: Long life Lithium battery - life-time depends upon settings and configuration - up to 5 years.
- **Type PC**: Intrinsically Safe long life lithium battery - life-time depends upon settings and configuration - up to 5 years.
- **Type PD**: 16 - 30V DC. Power consumption max. 1 Watt.
- **Type PF**: 24V AC / DC ± 10%. Power consumption max. 15 Watt.
- **Type PL**: Input loop powered from sensor signal 4 - 20mA (type A).
- **Type PM**: 115 - 230V AC ± 10%. Power consumption max. 15 Watt.
- **Type PX**: 8 - 30V DC. Power consumption max. 0.3 Watt.
- **Type ZB**: 20 - 30V DC. Power consumption max. 1 Watt. With type PF / PM: internally powered.

### Sensor excitation

- **Type PB/PC/PX**: Not available, just suitable for PT100 sensors.
- **Type PD**: The sensor supply voltage will be according to power supply voltage (as connected to terminal 5).
- **Type PF / PM**: 8.2 / 12 and 24V DC - max. 400mA @ 24V DC.

### Terminal connections

- **Type**: Removable plug-in terminal strip. Wire max. 1.5mm² and 2.5mm².

### Data protection

- **Type**: EEPROM backup of all settings. Data retention at least 10 years.
- **Pass-code**: Configuration settings can be pass-code protected.

## Casing

### General

- **Window**: Polycarbonate window.
- **Sealing**: Silicone.
- **Control keys**: Three industrial micro-switch keys. UV-resistant silicone keypad.

### Aluminum wall / field mount enclosures

- **General**: Die-cast aluminum wall/field mount enclosure IP67 / NEMA 4X with 2-component UV-resistant coating.
- **Dimensions**: 130 x 120 x 75mm (5.12” x 4.72” x 2.95”) - W x H x D.
- **Weight**: 1100 gr.
- **Type HA**: Cable entry: 2 x PG9 and 1 x M20.
- **Type HM**: Cable entry: 2 x M16 and 1 x M20.
- **Type HN**: Cable entry: 1 x M20.
- **Type HO**: Cable entry: 2 x M20.
- **Type HP**: Cable entry: 6 x M12.
- **Type HT**: Cable entry: 1 x 1½” NPT.
- **Type HU**: Cable entry: 3 x 1½” NPT.
- **Type HZ**: Cable entry: no holes.

### GRP wall / field mount enclosures

- **General**: GRP wall/field mount enclosure IP67 / NEMA 4X, UV-resistant and flame retardant.
- **Dimensions**: 130 x 120 x 75mm (5.12” x 4.72” x 2.95”) - W x H x D.
- **Weight**: 600 gr.
- **Type HD**: Cable entry: no holes.
- **Type HE**: Cable entry: 2 x Ø 16mm and 1 x Ø 20mm.
- **Type HF**: Cable entry: 1 x Ø 22mm (⁷/₈”).
- **Type HG**: Cable entry: 2 x Ø 20mm.
- **Type HH**: Cable entry: 6 x Ø 12mm.
- **Type HJ**: Cable entry: 3 x Ø 22mm (⁷/₈”).
- **Type HK**: Flat bottom, cable entry: no holes.

### Panel mount enclosures

- **Dimensions**: 130 x 120 x 60mm (5.12” x 4.72” x 2.36”) - W x H x D.
- **Panel cut-out**: 115 x 98mm (4.53” x 3.86”) L x H.
- **Type HB**: Die-cast aluminum panel mount enclosure IP65 / NEMA 4.
- **Weight**: 600 gr.
- **Type HC**: GRP panel mount enclosure IP65 / NEMA 4, UV-resistant and flame retardant.
- **Weight**: 450 gr.

### ABS wall / field mount enclosures

- **General**: Silicone free ABS wall/field mount enclosure IP65 with EPDM and PE sealings. UV-resistant polyester keypad (old HD enclosure).
- **Dimensions**: 130 x 114 x 71mm (5.1” x 4.5” x 2.8”) - W x H x D.
- **Weight**: 450 gr.
- **Type HS**: Cable entry: no holes.
Hazardous area

Intrinsically Safe

ATEX certification
II 1 G Ex ia IIC T4.

IECEx certification
II 1 D Ex iaD 20 IP 65 / 67 T 100 °C.

CSA c-us certification
Intrinsically Safe for Class I/II/III, Div. 1, Groups A, B, C, D, E, F, G, Temp. class T4 and Class I, Zone 0, AEx ia IIC T4.

Ambient -40°C to +70°C / -40° to +158°F.

Explosion proof

ATEX certification
II 2 GD EEx d IIB T5.

Type XE Dimensions of enclosure: 300 x 250 x 200mm (11.8” x 9.9” x 7.9”) L x H x D.

Weight Appr. 15kg.

Environment

Electromagnetic compatibility

Signal inputs

Temperature

Accuracy Resolution: 16 bit. Error < 0.01mA / ± 0.05% FS.

Type A (0) - 20mA. Analog input signal can be scaled to any desired range within 0 - 20mA.

Span 0.00001 - 199,999 with variable decimal position.

Offset -99,999 / +999,999 units.

Voltage drop Type A: max. 2V DC @ 20mA.

Voltage drop Type A - PL (loop powered): max. 2.6V DC @ 20mA.

Update time Four times per second.

Type T 2, 3 or 4 wire PT100.

Offset -999.9 / +999.9 units.

Update time Once per second.

Range -100°C to +200°C (-148°F to 392°F).

Accuracy 0.1°C (0.2°F).

Option ZV Range: -200°C to +800°C (-328°F to 1472°F).

Accuracy 0.5°C (0.9°F).

Type U 0 - 10V DC. Analog input signal can be scaled to any desired range within 0 - 10V DC.

Span 0.00001 - 199,999 with variable decimal position.

Offset -99,999 / +999,999 units.

Load impedance 3kΩ.

Update time Four times per second.

Note For signal A and U: power supply to temperature sensor is required; e.g. PD.

Operator functions

Display functions
Actual temperature, Measuring unit.

Temperature

Digits 5½, digits.

Units °C, °F or K.

Decimals Type T: 1.

Type A / U: 0 · 1 · 2 · 3 · 4 or 5.

Accessories

Mounting accessories

ACFo2 Stainless steel wall mounting kit.

ACFo5 Stainless steel pipe mounting kit (worm gear clamps not included).

ACFo6 Two stainless steel worm gear clamps Ø 44 - 56mm.

ACFo7 Two stainless steel worm gear clamps Ø 58 - 75mm.

ACFo8 Two stainless steel worm gear clamps Ø 77 - 95mm.

ACFo9 Two stainless steel worm gear clamps Ø 106 - 138mm.

ACFo10 Customized Grevopal tagplates for ACFo2 and ACFo5, including stainless steel screws.

Dimension: 95mm x 12.5mm (3.75” x 0.50”).

Cable gland accessories

ACF20 For HA enclosure, includes O-rings.

ACF25 For HE enclosure, includes locknuts and O-rings.

ACF26 For HF enclosure, includes locknuts and O-rings.

ACF27 For HG enclosure, includes locknuts and O-rings.

ACF28 For HH enclosure, includes locknuts and O-rings.

ACF29 For HJ enclosure, includes locknuts and O-rings.

ACF30 For HM enclosure, includes O-rings.

ACF31 For HL enclosure, includes O-rings.

ACF32 For HM enclosure, includes O-rings.

ACF33 For HE enclosure, includes O-rings.

ACF34 For HO enclosure, includes O-rings.

ACF35 For HP enclosure, includes O-rings.

ACF39 For HT enclosure, includes O-rings.

ACF40 For HU enclosure, includes O-rings.

Blind plug accessories

ACF50 For HA enclosure, includes O-rings.

ACF55 For HE enclosure, includes O-rings.

ACF56 For HF enclosure, includes O-rings.

ACF57 For HG enclosure, includes O-rings.

ACF58 For HH enclosure, includes O-rings.

ACF59 For HJ enclosure, includes O-rings.

ACF60 For HM enclosure, includes O-rings.

ACF61 For HL enclosure, includes O-rings.

ACF62 For HM enclosure, includes O-rings.

ACF63 For HE enclosure, includes O-rings.

ACF64 For HO enclosure, includes O-rings.

ACF65 For HP enclosure, includes O-rings.

ACF66 For HT enclosure, includes O-rings.

ACF67 For HU enclosure, includes O-rings.

ACF68 For HJ enclosure, includes O-rings.

ACF69 For HL enclosure, includes O-rings.

ACF70 For HM enclosure, includes O-rings.

Intrinsically Safe isolators accessories

ACGo2 MTL5025 - One channel power supply from safe area to hazardous area (e.g. to power the unit with PD or to power a switching or analog device in hazardous area).

ACGo3 MTL5042 - One channel 4 - 20mA repeater from hazardous area to safe area, including power supply.

Display example - 90 x 40mm (3.5” x 1.6”)

268.76
### Ordering information

**Standard configuration:** F040-A-HC-PX-XX-ZX.

<table>
<thead>
<tr>
<th>Ordering information:</th>
<th>F040</th>
<th>-H-</th>
<th>-P-</th>
<th>-X-</th>
<th>-Z-</th>
</tr>
</thead>
</table>

#### Temperature sensor input signal
- **A** @ (0)4 - 20mA input.
- **T** @ PT100 input.
- **U** @ 0 - 10V DC input.

#### Panel mount enclosures - IP65 / NEMA4
- **HB** @ Aluminum enclosure.
- **HC** @ GRP enclosure.

#### GRP field / wall mount enclosures - IP67 / NEMA4X
- **HD** @ Cable entry: no holes.
- **HE** @ Cable entry: 2 x Ø 16mm & 1 x Ø 20mm.
- **HF** @ Cable entry: 1 x Ø 22mm (3/4”).
- **HG** @ Cable entry: 2 x Ø 20mm.
- **HH** @ Cable entry: 6 x Ø 12mm.
- **HJ** @ Cable entry: 3 x Ø 22mm (3/4”).
- **HK** @ Flat bottom, cable entry: no holes.

#### Aluminum field / wall mount enclosures - IP67 / NEMA4X
- **HA** @ Cable entry: 2 x PG9 + 1 x M20.
- **HM** @ Cable entry: 2 x M16 + 1 x M20.
- **HN** @ Cable entry: 1 x M20.
- **HO** @ Cable entry: 2 x M20.
- **HP** @ Cable entry: 6 x M12.
- **HT** @ Cable entry: 1 x 1/2”NPT.
- **HU** @ Cable entry: 3 x 1/2”NPT.
- **HZ** @ Cable entry: no holes.

#### ABS field / wall mount enclosures
- **HS** @ Silicone free ABS field enclosure IP65 – Cable entry: no holes (old HD enclosure).

#### Power supply
- **PB** @ Lithium battery powered.
- **PC** @ Lithium battery powered - Intrinsically Safe.
- **PD** @ 16 - 30V DC + sensor supply.
- **PF** @ 24V AC / DC + sensor supply.
- **PL** @ Input loop powered from sensor signal 4 - 20mA (type A).
- **PM** @ 115 - 230V AC + sensor supply.
- **PX** @ Basic power supply 8 - 30V DC (no sensor supply for type A/U sensors).

#### Hazardous area
- **XI** @ Intrinsically Safe.
- **XF** @ EExd enclosure - 3 keys.
- **XX** @ Safe area only.

#### Other options
- **ZB** @ Backlight.
- **ZV** @ PRTD-range -200°C / +800°C.
- **ZX** @ No options.

The bold marked text contains the standard configuration.

@ Available Intrinsically Safe.