Features
• Displays actual pressure and alarm values.
• 4 alarm values can be entered: low-low, low, high and high-high pressure alarm.
• Large 17mm (0.67") digits.
• Selectable on-screen engineering units mbar, bar, PSI or no unit.
• Operational temperature -30°C up to +80°C (-22°F up to 178°F).
• Very compact design for panel mount, wall mount or field mount applications.
• Rugged aluminum field mount enclosure IP67 / NEMA4X.
• Intrinsically Safe II 1 GD EEx ia IIB/IIC T4 T100°C.
• Explosion/flame proof II 2 GD EEx d IIB T5.
• Alarm and analog signal outputs.
• Full Modbus communication RS232/485/TTL.
• Loop or battery powered, 8 - 24V AC/DC or 115 - 230V AC power supply.
• Sensor supply 3.2 / 8.2 / 12 / 24V DC.

Signal outputs
• Up to 4 free configurable alarm outputs.
• (0)4 - 20mA / 0 - 10V DC according to the actual pressure.

Signal input
Pressure
• (0)4 - 20mA.
• 0 - 10V DC.

Applications
• For applications where continuous pressure measurement and monitoring is important. Also re-transmission of the actual pressure or serial communication is required. Alternative basic model: F050 - F053 - F153.
General information

Introduction
The F153 is a versatile pressure indicator with continuous pressure monitoring feature. It offers the facility to set two low pressure and two high pressure alarm values. If desired, an ignore function can be set up to allow for an incorrect pressure for a certain period of time. Up to four outputs are available to transmit the alarm condition. A wide selection of options further enhance this models capabilities, including Intrinsic Safety and full Modbus communication.

Display
The display has large 17mm (0.67”) and 8mm (0.31”) digits which displays the pressure, measuring unit and alarm values. The alarm values can be password protected. On-screen engineering units are easily configured from a comprehensive selection.

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.

Analog output signal
The actual pressure is re-transmitted with the (0)4 - 20mA or 0 - 10V DC output signal. The output signal is updated ten times per second with a filter function being available to smoothen out the signal if desired. The output value is user defined in relation to the pressure, e.g. 4mA equals to 10 bar and 20mA equals to 100 bar. The output signal can be passive, active or isolated where the passive output type will loop power the F153 as well.

Alarm output
Up to four configurable outputs are available to transmit the alarm condition. You can have e.g. two the same low alarm outputs, one high alarm output and one “all alarms” output. Type OS offers four mechanical relay outputs. However, only two outputs are available in Intrinsically Safe applications. Three outputs are available in all other configurations. The output signals can be a passive NPN, active PNP or an isolated electro-mechanical relay.

Signal input
The F153 accepts (0)4 - 20mA and 0 - 10V DC input signals from any type of pressure measurement device.

Communication
All process data and settings can be read and modified manually or through the Modbus communication link (RS232 / RS485). Full Modbus functionality remains available for the Intrinsically Safe version (TTL).

Hazardous areas
For hazardous area applications, this model has been ATEX certified Intrinsically Safe II 1 GD EEx ia IIB / IIC T4 T100°C with an allowed operational temperature of -30°C to +70°C (-22°F to +158°F). A flame proof enclosure is also available with the rating II 2 GD EEx d IIB T5.

Enclosures
Various types of enclosures can be selected, all ATEX approved. As standard the F153 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 F153
Dimensions enclosures

Aluminum & GRP panel mount enclosure

Aluminum & GRP field / wall mount enclosures

Terminal connections

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

Flat bottom, no holes available.
**Typical wiring diagram F153-A-AP-CH-OT-PX**

**Typical wiring diagram F153-A-AA-CB-OA-PD**

*Supply voltage: 3.2 / 8.2 / 12 / 24V DC to sensor*

---

**TERMINAL CONNECTORS**

**F100 - series**

**OUTPUT LOOP POWERED**

- Common ground
- Supply *
- Signal
- Analog output type AP: passive 4 - 20mA (loop powered)
- Pressure sensor type A: (0)4 - 20mA
- Alarm output 1
- Alarm output 2
- Switch output type OT: passive transistor

**24V AC / DC POWER SUPPLY**

- Common ground
- Supply *
- Signal
- Analog output type AA: active 4 - 20mA
- Pressure sensor type A: (0)4 - 20mA
- Alarm output 1
- Alarm output 2
- Switch output type OT: active 24V DC signal

---

**TERMINAL CONNECTORS**

**F100 - series**

**282726**

**Modbus communication type CH: RS485 - 2 wire**

**Modbus communication type CB: RS232**

**Power supply type PD:**

- 8 - 24V AC / DC
Typical wiring diagram F153-A-AI-CI-OR-PM

Typical wiring diagram F153-A-AP-CB-OS-PD

*Supply voltage: 3.2 / 8.2 / 12 / 24V DC to sensor
**Hazardous area applications**

The F153-XI has been ATEX approved by KEMA for use in Intrinsically Safe applications. It is approved according to II 1 GD EEx ia IIB/IIC T4 T100°C for gas and dust applications with an operational temperature range of -30°C to +70°C (-22°F to +158°F). Besides the I.S. power supplies for the two alarm outputs, it is allowed to connect up to three I.S. power supplies in IIB applications or one in IIC applications. Full functionality of the F153 remains available, including two alarm outputs and 4 - 20mA output and Modbus communication (type CT). Power supply type PD-XI offers a sensor supply according to the connected power supply voltage at terminal 1. A 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 03ATEX1074 X**

**Configuration example IIB**

*F153-A-AF-CT-OT-PL-XI* - Input loop powered unit
Configuration example IIB - F153-A-AP-CT-OT-PX-XI - Output loop powered

**TERMINAL CONNECTORS**

<table>
<thead>
<tr>
<th>Connector</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>F100</td>
<td>Series</td>
</tr>
</tbody>
</table>

**HAZARDOUS AREA**

- Modbus communication type CT: TTL
- ISOLATOR: I.S. Certified Isolator
  - TTL to RS232 / RS422 / TTL
  - For example: MTL5001

**SAFE AREA**

- Common ground
- Common ground
- Signal
- Supply *

**Circuit depends on type of signal**

**Analog output type AP:**
- Passive 4 - 20mA (output loop powered)

**Pressure sensor input type:** A (0) 4 - 20mA

**Ci is negligibly small**

**Power Supply**

- Uo: max 30V
- Io: max 100mA
- Po: max 750mW

For example: MTL5025

**Switch output type OT:**
- Passive transistor

**Alarm output 1**
- Ci is negligibly small

**Alarm output 2**
- Ci is negligibly small

**Power Supply**

- Uo: max 30V
- Io: max 100mA
- Po: max 750mW

For example: MTL5025

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

* Note sensor supply voltage: 3.2V DC - not suitable to power analog sensors.
Configuration example IIB and IIC - F153-A-AP-(CT)-OT-PD-XI - Power supply 16 - 30V DC

**TERMINAL CONNECTORS**

F100 - series

<table>
<thead>
<tr>
<th>Common ground</th>
<th>Common ground</th>
<th>Common ground</th>
<th>Common ground</th>
</tr>
</thead>
<tbody>
<tr>
<td>RXD</td>
<td>TXD</td>
<td></td>
<td></td>
</tr>
<tr>
<td>+12V</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>CTR</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Power supply type PD: 16 - 30V DC</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

**HAZARDOUS AREA**

Modbus communication type CT: TTL

Please note: communication type CT is not allowed in IIC applications.

<table>
<thead>
<tr>
<th>Upmax 30V</th>
<th>Iomax 250mA</th>
</tr>
</thead>
<tbody>
<tr>
<td>TTL to RS232 / RS422 / TTL</td>
<td></td>
</tr>
<tr>
<td>For example: MTL5051</td>
<td></td>
</tr>
</tbody>
</table>

**TOTAL Ci OF ALL CONNECTED ANALOG APPARATUS IN IIC APPLICATIONS MAY NOT EXCEED 66nF MINUS 17nF (17nF IS USED BY THE ANALOG OUTPUT SIGNAL TERMINAL 7 + 8).**

**SAFE AREA**

Supply *

Pressure sensor input type: A (0) 4 - 20mA

Ci is negligibly small

5 6 | 7 8 | Common ground |

Analog output type AP: passive 4 - 20mA

Ci is negligibly small

7 8 | Common ground |

Switch output type OT: passive transistor

Ci is negligibly small

Alarm output 1

7 8 | Common ground |

Alarm output 2

7 8 | Common ground |

Power supply type PD: 16 - 30V DC

(please note: PD and battery supply (type PC) is NOT allowed in IIC applications).

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

* Note power supply type PD: the supply voltage to the analog sensor is as connected to terminal 1 (internally linked).
Configuration example IIB - F153-A AF-CT-OT-PD-XI - Power supply 16 - 30V DC

TERMINAL CONNECTORS
F100 - series

HAZARDOUS AREA

SAFE AREA

Ci = 17nF

3 4 9 1 0 11

Common ground
Common ground
Common ground

Signal
Supply *

Main supply

Due to analog output type AF, the unit has to be powered with battery type PC, with external power supply type PD or input loop powered type PL.

Power supply type PD: 16 - 30V DC

* Note power supply type PD: the supply voltage to the analog sensor is as connected to terminal 1 (internally linked).

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

#### General

**Display**

- **Type**: High intensity reflective numeric and alphanumeric LCD, UV-resistant.
- **Dimensions**: 90 x 40mm (3.5” x 1.6”).
- **Digits**: Seven 17mm (0.67”) and eleven 8mm (0.31”) digits. Various symbols and measuring units.
- **Refresh rate**: User definable: 8 times/sec. - 30 secs.
- **Option ZB**: Transflective LCD with green LED backlight. Good readings in full sunlight and darkness.
- **Note ZB**: Only available for safe area applications.

**Operating temperature**

- **Operational**: -30°C to +80°C (-22°F to +178°F).
- **Intrinsically Safe**: -30°C to +70°C (-22°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**: 8 - 24V AC / DC ± 10%. Power consumption max. 10 Watt. Intrinsically Safe: 16 - 30V DC; power consumption max. 0.75 Watt.
- **Type PF**: 24V AC / DC ± 10%. Power consumption max. 15 Watt.
- **Type PL**: Input loop powered from sensor signal 4 - 20mA (type “A”) - requires types AI or AF and OT.
- **Type PM**: 115 - 230V AC ± 10%. Power consumption max. 15 Watt.
- **Type PX**: 8 - 30V DC. Power consumption max. 0.5 Watt.
- **Type ZB**: 12 - 24V DC ± 10% or type PD / PF / PM. Power consumption max. 0.5 Watt.

**Note PB/PC/PM**: Not available Intrinsically Safe.

**Note PF/PM**: The total consumption of the sensors and outputs may not exceed 400mA @ 24V.

**Note**: For Intrinsically Safe applications, consult the safety values in the certificate.

**Sensor excitation**

- **Type PB/PC/PL/PX**: 3.2V DC.
  - Note: This is not a real sensor supply. Only suitable for sensors with a very low power consumption.
- **Type PD**: 3.2 / 8.2 / 12 / 24 V DC - max. 50mA @ 24V DC.
- **Type PD-XI**: The sensor supply voltage will be according to power supply as connected to terminal 1.
- **Type PF / PM**: 3.2 / 8.2 / 12 / 24 V 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.

**Environment**


### Hazardous area

**General**

- **ATEX approval ref.**: II 1 GD EEx ia IIB/IIC T4 T50°C.
- **Type XI**: Maximum ambient +70°C (158°F).
- **Explosion proof**: ATEX approval ref.: II 2 GD EEx d IIB T5.
- **Type XF**: Dimensions of enclosure: 300 x 250 x 200mm (11.8” x 9.9” x 7.9”). L x H x D.
- **Weight**: appr. 15 Kg.

### 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 1/2” NPT.
- **Type HU**: Cable entry: 3 x 1/2” 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”). L x H x D.
- **Weight**: 450 gr.
- **Type HS**: Cable entry: no holes.
**Signal inputs**

**Pressure sensor**
- Accuracy: Resolution: 14 bit. Error < 0.025mA / ± 0.125% FS.
- Low level cut-off programmable.
- Update time: Four times per second.
- Span: 0.000000 - 999,999 with variable decimal position.
- Offset: -999,999 - 999,999.
- Type A: (0)4 - 20mA. Analog input signal can be scaled to any desired range within 0 - 20mA.
- Voltage drop: 2.5V @ 20mA.
- Type U: 0 - 10V DC. Analog input signal can be scaled to any desired range within 0 - 10V DC.
- Load impedance: 3kΩ.
- Note: For signal type A and U: external power to sensor required; e.g. PD.

**Signal outputs**
- Analog output
  - Function: Transmitting actual pressure.
  - Accuracy: 10 bit. Error < 0.05%. Analog output signal can be scaled to any desired range.
  - Update time: Ten times per second.
  - Type AA: Active 4 - 20mA output (requires OA + PD, PF or PM).
  - Type AB: Active 0 - 20mA output (requires OA + PD, PF or PM).
  - Type AF: Passive floating 4 - 20mA output for Intrinsically Safe applications (requires PC, PD or PL).
  - Type AI: Passive galvanically isolated 4 - 20mA output - also available for battery powered models (requires PB, PD, PL or PM).
  - Type AP: Passive 4 - 20mA output - not isolated. Unit will be loop powered.
  - Type AU: Active 0 - 10V DC output (requires OA + PD, PF or PM).

**Alarm output**
- Function: User defined: low, low-low, high, high-high or all alarms output.
- Type OA: Three active 24V DC transistor outputs (PNP); max. 50mA per output (requires AA + PD, PF or PM).
- Type OR: Two electro-mechanical relay outputs isolated (N.O.) - max. switch power 230V AC · 0.5A (requires PF or PM) and one transistor output relay TO or OA (OA in combination with AA only).
- Type OS: Four electro-mechanical relay outputs - isolated; max. switch power 230V AC · 0.5A per relay (requires AP and PD with 24V AC / DC).
- Type OT: Three passive transistor outputs (NPN) - not isolated. Max. 50V DC · 300mA per output.
- Note: Intrinsically Safe applications: only two transistor outputs type OT available.

**Communication option**
- Function: Reading display information, reading / writing all configuration settings.
- Protocol: Modbus ASCII / RTU.
- Speed: 1200 - 2400 - 4800 - 9600 baud.
- Addressing: Maximum 255 addresses.
- Type CB: RS232
- Type CH: RS485 2-wire
- Type CI: RS485 4-wire
- Type CT: TTL Intrinsically Safe.

**Pressure**
- Digits: 6 digits.
- Units: mbar, bar, PSI, no unit.
- Decimals: 0 - 1 - 2 - 3.

**Alarm values**
- Digits: 6 digits.
- Units: According to the settings for pressure.
- Decimals: According to the settings for pressure.
- Time units: According to the settings for pressure.
- Type of alarm: Low, high, low-low or high-high pressure alarm. Includes alarm delay time and configurable alarm outputs.

**Accessories**
- Mounting accessories
  - ACF02: Stainless steel wall mounting kit.
  - ACF05: Stainless steel pipe mounting kit (worm gear clamps not included).
  - ACF06: Two stainless steel worm gear clamp Ø 44 - 56mm.
  - ACF07: Two stainless steel worm gear clamp Ø 58 - 75mm.
  - ACF08: Two stainless steel worm gear clamp Ø 77 - 95mm.
  - ACF09: Two stainless steel worm gear clamp Ø 106 - 138mm.
  - ACF10: Customized Grevopal tagplates for ACF02 and ACF05, 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 HM enclosure, includes O-rings.
  - ACF30: For HA enclosure, includes O-rings.
  - ACF32: For HE enclosure, includes locknuts and O-rings.
  - ACF33: For HF enclosure, includes locknuts and O-rings.
  - ACF34: For HG enclosure, includes locknuts and O-rings.
  - ACF35: For HH enclosure, includes locknuts and O-rings.
  - ACF36: For HM enclosure, includes O-rings.
  - ACF39: For HT enclosure, includes O-rings.
  - ACF40: For HA enclosure, includes O-rings.
- Blind plug accessories
  - ACF50: For HA enclosure, includes O-rings.
  - ACF55: For HE enclosure, includes locknuts and O-rings.
  - ACF56: For HF enclosure, includes locknuts and O-rings.
  - ACF57: For HG enclosure, includes locknuts and O-rings.
  - ACF58: For HH enclosure, includes locknuts and O-rings.
  - ACF59: For HM enclosure, includes O-rings.
  - ACF60: For HA enclosure, includes O-rings.
  - ACF63: For HE enclosure, includes O-rings.
  - ACF64: For HF enclosure, includes O-rings.
  - ACF65: For HG enclosure, includes O-rings.
  - ACF66: For HH enclosure, includes O-rings.
  - ACF69: For HM enclosure, includes O-rings.
  - ACF70: For HA enclosure, includes O-rings.
Ordering information


Pressure signal
A (0)4 - 20mA input.
U 0 - 10V DC input.

Analog output signal
AA Active 4 - 20mA output - requires OA + PD, PF or PM.
AB Active 0 - 20mA output - requires OA + PD, PF or PM.
AF Active 4 - 20mA output - requires PC, PD or PL.
AI Isolated 4 - 20mA output - requires PB, PD, PF or PL.
AP Passive 4 - 20mA output, loop powered unit.
AU Active 0 - 30V DC output - requires OA + PD, PF or PM.

Communication
CB Communication RS232 - Modbus ASCII / RTU.
CH Communication RS485 - 2-wire - Modbus ASCII / RTU.
CL Communication RS485 - 4-wire - Modbus ASCII / RTU.
CX No communication.

Flow equations
EX No flow equations.

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).

Additional inputs
IX No additional input.

Outputs
OA Three active transistor outputs - requires AA, AB or AU and PD, PF or PM.
OR Two mechanical relay outputs + one OT or OA - requires PF or PM.
OS Four mechanical relay outputs - requires AP and PD.
OT Three passive transistor outputs - standard configuration.

Power supply
PB Lithium battery powered.
PC Lithium battery powered - Intrinsically Safe.
PD 8 - 24V AC / DC + sensor supply + with XI: 16 - 30V DC.
PF 24V AC / DC + sensor supply.
PL Input loop powered from sensor signal type “A” - requires AI or AF and OT.
PM 115 - 230V AC + sensor supply.
PX Basic power supply 8 - 30V DC (no real sensor supply). Unit requires external loop AP.

Temperature input signal
TX No temperature input signal.

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

Other options
ZB Backlight.
ZX No options.

The bold marked text contains the standard configuration.

Specifications are subject to change without notice.

FLUIDWELL bv
P.O. Box 6
5460 AA - Veghel - The Netherlands
Tel.: +31 (0)413 343786
Fax.: +31 (0)413 363443
sales@fluidwell.com
Internet: www.fluidwell.com

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