Honeywell
THE POWER OF CONNECTED | Gas Detection

Touchpoint Plus

Safety Manual

Contents

1 Overview

IEC 61508 is a generic functional safety standard. Functional safety is defined in IEC 61508 as "part of the overall safety relating to the equipment under control (EUC) and the EUC control system which depends on the correct functioning of the E/E/PES (Electrical/Electronic/Programmable Electronic Systems) safety related to systems, other technology safety-related systems, and external risk re-duction facilities.

The basic operation principle and product descriptions are explained in the user manual of Touch-point Plus. Please refer to Honeywell Analytics website: http://www.honeywellanalytics.com/en-gb/products/Touchpoint-Plus where Touchpoint Plus user manual (part number: 3011M5001) is avail-able.

Touchpoint Plus has various outputs but only below two output signals are under SIL2 scope:

- Relay output
- 4-20 mA current output

Touchpoint Plus is SIL2 approved by SGS TUV SAAR (Certificate number: FS/71/220/17/0178) with the following safety parameters in accordance with the combination of input board type (mA input, mV input and Dual input) and output function (4-20 mA and Relay), Touchpoint Plus's detail PDF and PFH can be summarized as followings:

1) Touchpoint Basic Unit

Input	Safety Function	SFF	PDF_{avg}	PFH
mA Input	4-20 mA	> 90%	5.73×10^{-4}	1.22×10^{-7}
	Relay	> 90%	5.73×10^{-4}	1.21×10^{-7}
mV Input	4-20 mA	> 90%	9.48×10^{-4}	2.03×10^{-7}
	Relay	> 90%	9.48×10^{-4}	2.03×10^{-7}
Dual Input	4-20 mA	> 90%	7.98×10^{-4}	1.70×10^{-7}
	Relay	> 90%	7.98×10^{-4}	1.69×10^{-7}

2) Touchpoint Expansion Unit

Input	Safety Function	SFF	PDF_{avg}	PFH
mA Input	4-20 mA	> 90%	6.02×10^{-4}	1.27×10^{-7}
	Relay	> 90%	6.01×10^{-4}	1.26×10^{-7}
mV Input	4-20 mA	> 90%	9.77×10^{-4}	2.08×10^{-7}
	Relay	> 90%	9.76×10^{-4}	2.07×10^{-7}
Dual Input	4-20 mA	> 90%	8.27×10^{-4}	1.74×10^{-7}
	Relay	> 90%	8.26×10^{-4}	1.73×10^{-7}

where,

SFF: Safe Failure Fraction. A percentage of safe failures as compared to all failures

PFD_{avg}: Average probability of failure to perform its design function on demand (1-year normalized value)

PFH: Probability of a dangerous failure per hour

2 Proof Test Interval

The purpose of a proof test is to return the unit to “as new” in terms of its safety parameters. The proof test interval is 1 year. According to IEC 61508, users are allowed to extend the proof test inter-val to meet their system needs. Honeywell Analytics allows such an extension, as long as the user follows the proper calculation method for calculating a proof test interval as defined in IEC 61508 for the desired SIL level.

Note

The proof test interval should not preclude more frequent maintenance of Touchpoint Plus in ac-cordance with the Operating Instruction (3011M5001) if the site conditions require it.

3 Safety Function

Touchpoint Plus has two kinds of safety function: 1) Relay output and 2) 4-20 mA current output. The safety function must operate as intended for SIL2 and here is the brief summary of intended opera-tion of each safety function.

1) Relay output

	Status	Description	Intended operation
System fault relay	Normal	No fault in Touchpoint Plus and gas sensors connected to Touchpoint Plus	Energized
	Fault	Any troubles happened by internal diagnostic function in Touchpoint Plus and the trouble from gas sensors connected to Touchpoint Plus	De-energized
Channel relay	Normal Fault Alarm Inhibit Warning	Channel relay is to monitor input gas sensor's status. The default channel relay setting is de-energized for normal status. Customer has to configure channel relay setting for input gas sensor's fault, alarm, inhibit and warning status	Energized or De-energized

2) 4-20 mA output

Status	Description	Intended operation*
Normal	The status of measuring the gas. 4-20mA analog current value has output by measured gas value. The current output is a scaled 4-20mA output value where 4mA represents zero gas and 20mA represents full scale	4 – 20 mA
Inhibit	Warm-up, calibration and inhibit setting of Touchpoint Plus and gas sensor's inhibit situation. Gas measurement is stopped and 4-20mA output value is fixed to the 2 mA.	2 mA
Over-range	The status that the measured gas value is over the over-range setting value. 4-20mA output value is fixed to the 3 mA.	3 mA
Under-range	The status that the measured gas value is under the under-range setting value. 4-20mA output value is fixed to the 3 mA.	3 mA
Fault	The case that the trouble is happened by internal Diagnostic function and gas sensor's fault. The gas measurement is stopped and 4-20mA output value is fixed to 1 mA.	0 – 1 mA

* The mA value in the Intended operation is a default setting. It is highly recommend that user should NOT change the default setting of mA value in each status

4 Proof Test Procedure

4.1 Relay output proof test procedure

4.1.1 Force relay

The relays in Touchpoint Plus can be tested by using the menu of “Force Relay”. “Force Relay” is to verify relay operation regardless of relay setting and gas sensor input. This is to verify if relay is energized or de-energized correctly. Please refer to the section 9.2.2 of 3011M5001 to conduct “Force Relay”. If any relays do not work correctly in force relay, please contact Honeywell Analytics for further services.

4.1.2 Relay configuration

Channel relays will operate per user’s configuration. User is responsible for configuring each channel relay’s operation (energize or de-energize) in the event of alarm 1, alarm 2, alarm 3, fault, inhibit and warning. Please refer to the section 6.4.16 of 3011M5001 to verify relay configuration. The user is responsible for relay configuration. It is highly recommend that user should check the relay operation as configured. This can be done by relay simulator, described in user manual section 9.3.

4.1.3 Zero gas and relay

1) Apply zero gas to the sensor
2) The relay operation should be as intended per user’s relay configuration. If the relay operation is incorrect, refer to 6.15.2 (mV input sensor) and 6.15.3 (mA input sensor) of 3011M5001 and complete a zero gas calibration procedure. Otherwise, please contact Honeywell Analytics for further services.

4.1.4 Span gas and relay

1) Apply calibration gas to the sensor
2) The relay operation should be an intended per user’s realy configuration. If the relay operation is incorrect, refer to 6.15.2 (mV input sensor) and 6.15.3 (mA input sensor) of 3011M5001 and complete a span gas calibration procedure. Otherwise, please contact Honeywell Analytics for further services

4.2 mA output proof test procedure

4.2.1 Force mA

Each mA output channel of Touchpoint Plus can be tested by forcing the mA output. “Force 4-20 mA” is to verify mA output where user can select the mA value and measure the mA output from Touch-point Plus by using the multimeter. Please refer to the section 9.2.3 of 3011M5001 to conduct “Force 4-20 mA”.

Be sure that input channel and mA output channel configuration is correct before checking Force mA. The tolerance for mA output shall be +/- 0.1 mA. For example, mA output is set at 4 mA in “Force 4-20 mA”, then the actual measurement shall be ranged from 3.9 mA to 4.1 mA. Otherwise, please contact Honeywell Analytics for further services

4.2.2 Zero gas and mA output

1) Apply zero gas to the sensor

2) The current output should be 4.0 +/- 0.1 mA (default setting). If the mA output is not at the toler-ance when applying zero gas, perform a zero gas calibration per 6.15.2 (mV input sensor) and 6.15.3 (mA input sensor) of 3011M5001. Otherwise, please contact Honeywell Analytics for further services.

3) It should be careful when use with mA input sensor. mA input sensor may produce incorrect mA signal to Touchpoint Plus's mA channel. Please verify if mA input sensor generates the accurate mA signal to Touchpoint Plus. For example, user can connect mA loop calibrator (accurate source of mA signal) to the mA channel of Touchpoint Plus. Then, user can verify if mA sensor generates incorrect output or Touchpoint Plus's mA channel produces incorrect mA output.

4.2.3 Span gas and mA output

1) Apply calibration gas to the sensor

2) The mA output measured is related to the percentage of gas applied. For example, As a default setting, 100 % of full gas concentration is equivalent to 20.0 mA. If 75% of the full scale gas concentration is applied, the mA output should be 16.0 mA per the default setting.The acceptable tolerance is +/- 0.1 mA. If the tolerance is out of +/- 0.1 mA, refer to 6.15.2 (mV input sensor) and 6.15.3 (mA input sensor) of 3011M5001 and complete a span gas calibration procedure. Otherwise, please contact Honeywell Analytics for further services

4.2.4 Verification of mA output configuration

mA output is configurable to each of Touchpoint Plus status (e.g. Normal, inhibit, over-range, under-range and fault). Users can check if Touchpoint Plus's mA output is identical to user's mA configura-tion setting.

1) Normal and under/over range: Gas test using a zero and calibration gas – zero gas and calibration gas test shall show the mA output per zero gas configuration and calibration gas, respectively. This process shall be same as section 4.2.2 and 4.2.3 of this manual but the target mA value shall be user's configuration value +/- 0.1 mA.

2) Inhibit and fault: When Touchpoint Plus is inhibit mode when menu mode is started. When Touch-point Plus stays in menu mode, user can check if mA output is identical to inhibit setting value. mA output for fault status can be verified by simulating the fault status, e.g. disconnect the sensor. The mA output at inhibit and fault status shall be the target value of configuration value +/- 0.1 mA.

If any of the mA output at each status is out of tolerance, please check the mA output value configu-ration. Otherwise, please contact Honeywell Analytics.

Find out more at www.honeywellanalytics.com

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