

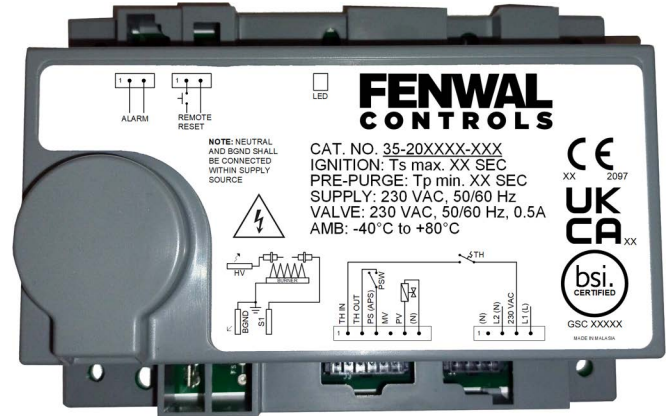
SERIES 35-20

230 VAC Microprocessor-Based Direct Spark Ignition Control

F-35-20
November 2025

FEATURES

- Safe start with DETECT-A-FLAME® flame sensing technology
- Custom pre-purge and inter-purge timings*
- Inducer blower control and airflow switch monitoring
- Single or three trials for ignition
- System diagnostic LED
- Flame current test points
- Local or remote flame sensing
- Automatic reset**
- Alarm output (normally closed contact)



APPLICATIONS

- Gas furnaces
- Boilers
- Commercial cooking
- Water heaters
- Other gas-fired appliances

DESCRIPTION

The 35-20 is a 230 VAC direct spark ignition (DSI) control designed for use in all types of gas-fired appliances. The control uses a microprocessor to continually and safely monitor, analyze and control the proper operation of a gas burner and inducer blower. On-board diagnostics with LED output makes troubleshooting easy and ensures safe and efficient operation.

Export Information (USA)

Jurisdiction: EAR
ECCN: EAR99

Agency Certifications



CE Approved to EN 298:2022***



Australian Gas Safety certification to EN 298:2022 & AS 4625-2008

* Pre-purge time cannot exceed inter-purge time on CE Approved models.

** Automatic reset is not allowed for CE Approved models.

*** EMC emission requirements shall be verified after incorporation of the burner control system into the end use appliance.

SPECIFICATIONS

| | |
|-----------------------------------|--|
| Input Power | 187V to 264V at 50/60Hz |
| Line Voltage | 187V to 264V at 50/60Hz (L1 & IND contacts only) |
| Input Current | 0.25 A maximum @ 230VAC 50Hz, 25°C |
| Gas Valve | 1.0A, 230VAC, LRA, 0.6pf 0.5A, 230VAC, FLA |
| Operating Temperature | -40°F to +176°F (-40°C to +80°C) |
| Storage Temperature | -40°F to +185°F (-40°C to +85°C) |
| Flame Sensitivity | 0.7 µA minimum |
| Flame Failure Response | 0.8 seconds maximum |
| Flame Detector Self-check Rate | Once per second minimum |
| Gas Types | Natural, LP, or manufactured |
| Spark Rate: | 25 sparks/sec |
| Size (LxWxH) with enclosure | 5.69 x 3.94 x 1.87 inches (14.45 x 10.01 x 4.75 cm) |
| Moisture Resistance | Conformal coated to operate non-condensing to 95% R.H. Module should not be exposed to water |
| Ingress Protection | IP-20 (with cover) |
| Tries for Ignition | One or three try versions available |
| Trial for Ignition Periods | 4, 7, 10, 15 seconds available |
| Pre-purge and Inter-purge Timings | 0, 15 or 30 seconds available |
| Post-purge Time | 0, 30 or 60 seconds available |
| Alarm | Dry Contact Programmable 1A at 24VAC - 230VAC / 30VDC |
| Fuse | Non-replaceable |
| Reset | Volatile & Non-Volatile lockout with manual reset (optional) |

SEQUENCE OF OPERATION / FLAME RECOVERY / SAFETY LOCKOUT

Power Up / Stand By

35-20 has the option for full time power or powered when 230Vac is applied to TH. Upon applying power or TH, the control will reset, perform a self- check routine, flash the diagnostic LED and enter the thermostat scan state.

Start Up - Heat Mode

When a call for heat is received from the thermostat supplying 230VAC to TH/W, the control begins a pre-purge delay. Following the pre-purge period, the gas valve is energized and sparking commences for the Trial For Ignition (TFI) period.

When flame is detected during the TFI, the sparking process is terminated and the gas valve remains energized. The thermostat and burner flame are constantly monitored to assure proper system operation. When the thermostat is satisfied and the demand for heat ends, the gas valve is immediately de- energized.

Failure to Light - Lockout

SINGLE TRIAL MODEL

Should the burner fail to light, or a flame is not detected during the TFI period, the gas valve will de-energize and the control will go into lockout. The LED will indicate the fault code for ignition lockout.

MULTI TRIAL MODEL

Should the burner fail to light or the flame is not detected during the TFI period, the gas valve will de-energize. The control will then go through an inter-purge delay before an additional ignition attempt. The control attempts two additional ignition trials before de-energizing the gas valve and entering lockout. The LED will indicate the fault code for ignition lockout.

FLAME FAILURE - RE-IGNITION MODE

If the established flame signal is lost while the burner is operating, the control will respond within 0.8 seconds by immediately energizing the H.V. spark for the TFI period in an attempt to relight the flame. If the burner does not light within the TFI, the gas valve will immediately de-energize and single try models will enter lockout. On multi-try models, a new TFI sequence will begin after an inter-purge delay. Multi-try models perform two additional attempts to light the burner before de-energizing the gas valve and entering lockout. If the burner relights, normal operation resumes.

FLAME FAILURE-RECYCLE MODE





With the "Recycle After Loss of Flame" option, upon loss of flame, the gas valve is de-energized and the control proceeds to inter-purge before attempting to relight the flame. Multi-try models permit three tries for ignition including inter-purges. If the burner relights, normal operation resumes. If the burner does not relight, the control will enter lockout.

Lockout Recovery

Recovery from lockout requires a manual reset by either resetting the thermostat, or removing 230 VAC for a period of 5 seconds. On models with automatic reset, if the thermostat is still calling for heat after one hour, then the control will automatically reset and attempt to ignite the burner.

MOUNTING AND WIRING

The Series 35-20 control is not position sensitive and can be mounted vertically or horizontally. The case may be mounted on any surface with #6 sheet metal screws. The control also supports direct mounting to a standard NEC 4-in. junction box.

| | |
|---|--|
|  | All wiring must be performed in accordance with both local and national electrical codes. |
|  | Label all wires prior to disconnection when servicing controls. Wiring errors may cause improper and dangerous operation. A functional checkout of a replacement control should always be performed. |
|  | This product uses voltages of shock hazard potential. Wiring and initial operation must be performed by a qualified service technician. |
|  | Operation outside specifications could result in failure of the Fenwal product and other equipment with potential for injury to people and property. |

| Terminal Designations | | |
|-----------------------|-------------------------|---|
| Terminal | I/O | Description |
| J1 | Pin 1: N | 4-Pin Molex Microfit Mate-n-Lok Connector P/N 43650-0418 |
| | Pin 2: L2 (N) | |
| | Pin 3: 230VAC TH Out | |
| | Pin 4: L1 (L) | |
| J3 | Pin 1: TH In | 6-Pin Molex Microfit Mate-n-Lok Connector P/N 43650-0618 |
| | Pin 2: Open | |
| | Pin 3: Open | |
| | Pin 4: Open | |
| | Pin 5: V1 | |
| | Pin 6: (N) | |
| J2 (Optional) | Pin 1: Alarm Mains | 2-Pin Molex Microfit Mate-n-Lok Connector P/N 43650-0218 |
| | Pin 2: Alarm Load | |
| J4 (Optional) | Pin 1 & 2: Manual Reset | 2-Pin Molex Header 0.025 Square, 0.1 Center P/N: 22-23-2021 |
| HV | Hi-Voltage | 0.25 in. Quick Connect |
| FS | Remote-Sense | 0.25 in. Quick Connect |
| GND | Ground | 0.25 in. Quick Connect |

Note: NC terminal is not available on CE Approved models.

Wiring Diagrams - 35-605

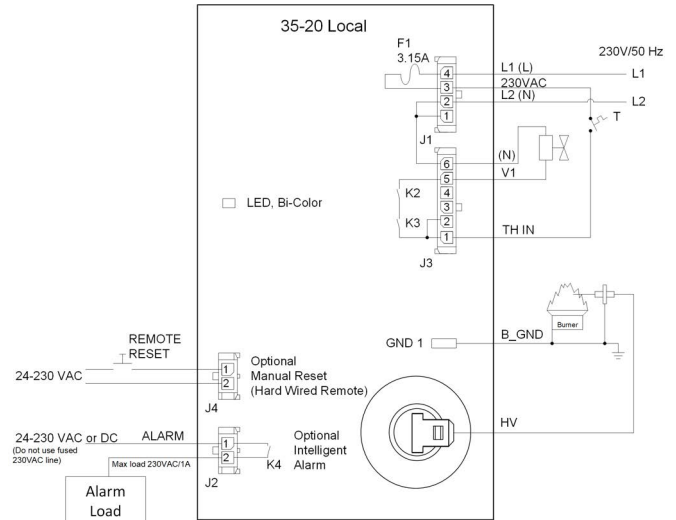


Figure 1. Local Sense

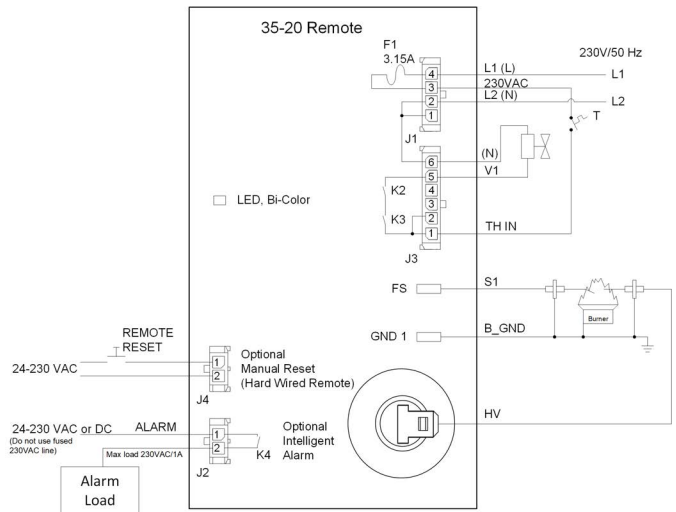


Figure 2. Remote Sense

High Voltage and Remote Sense Cable Requirements

The HV Ignition Cable must meet a voltage rating of 25 KV and an insulation rating of 200 °C. Recommend length of 3ft (.9m) or less. Consult factory for longer lengths.

Remote flame sense cable must meet a voltage rating of 250V and an insulation rating of 200 °C. Recommended length of 10ft (3m) or less. Consult Factory for longer lengths.

TROUBLESHOOTING

| Troubleshooting Guide | |
|---|--|
| Symptom | Recommended Actions |
| 1. Control does not start | A. Miswired B. Fuse circuit breaker fault C. Faulty control, check LED for fault codes |
| 2. Thermostat on - no spark | A. Miswired B. Faulty thermostat, no voltage at thermostat terminal TH/W C. Faulty control, check LED for fault codes |
| 3. Blower on - no TFI after purge delay | A. Miswired B. Flame fault C. Airflow fault (check voltage at PSW) D. Faulty control (check voltage between L1 & IND) |
| 4. Valve on - no spark during TFI | A. Shorted electrode - establish 1/8-inch gap B. Check high voltage cable C. Miswired |
| 5. Spark on - valve off | A. Valve coil open B. Valve wire disconnected C. Faulty control, check voltage at gas valve terminal V1 |
| 6. Flame okay during TFI - no flame sense after TFI | A. Check electrode position B. Check high voltage wire C. Poor ground at burner D. Poor flame, check flame current |

Bi-Color LED Codes

| Red LED Fault Conditions | |
|--------------------------|-----------------------------|
| LED Indication | Fault Mode |
| Steady On | Internal Control Failure |
| 1 Flash | Airflow Fault |
| 2 Flashes | Flame without call for heat |
| 3 Flashes | Ignition Lockout |

| Green LED Diagnostics | |
|-----------------------|---------------|
| LED Indication | Fault Mode |
| Steady On | Idle Mode |
| Slow Flash | Call for Heat |
| Fast Flash | Burn Mode |

Note: During a fault condition, the LED will flash on for 1/4 second and off for 1/4 second as needed to indicate the fault code. The code will repeat every 3 seconds. Removing power from the control will clear the fault code.

Internal Control Failure

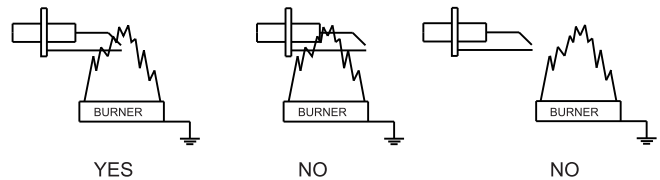
If the control detects a software or hardware error, all outputs are turned off and the LED displays a Steady On condition. If this condition persists after an attempt to restart, then the control must be replaced.

Flame Fault

If at any time the gas valve fails to completely close and maintains a flame, the flame sense circuit will detect it and energize the inducer blower. Should the valve later close completely removing the flame signal, the inducer blower will be turned off following the optional post purge period.

Proper Electrode Location

Proper location of electrode assembly is important for optimum system performance. The electrode assembly should be located so that the tips are inside the flame envelope and about 1/2-inch (1.2 cm) above the base of the flame as shown:

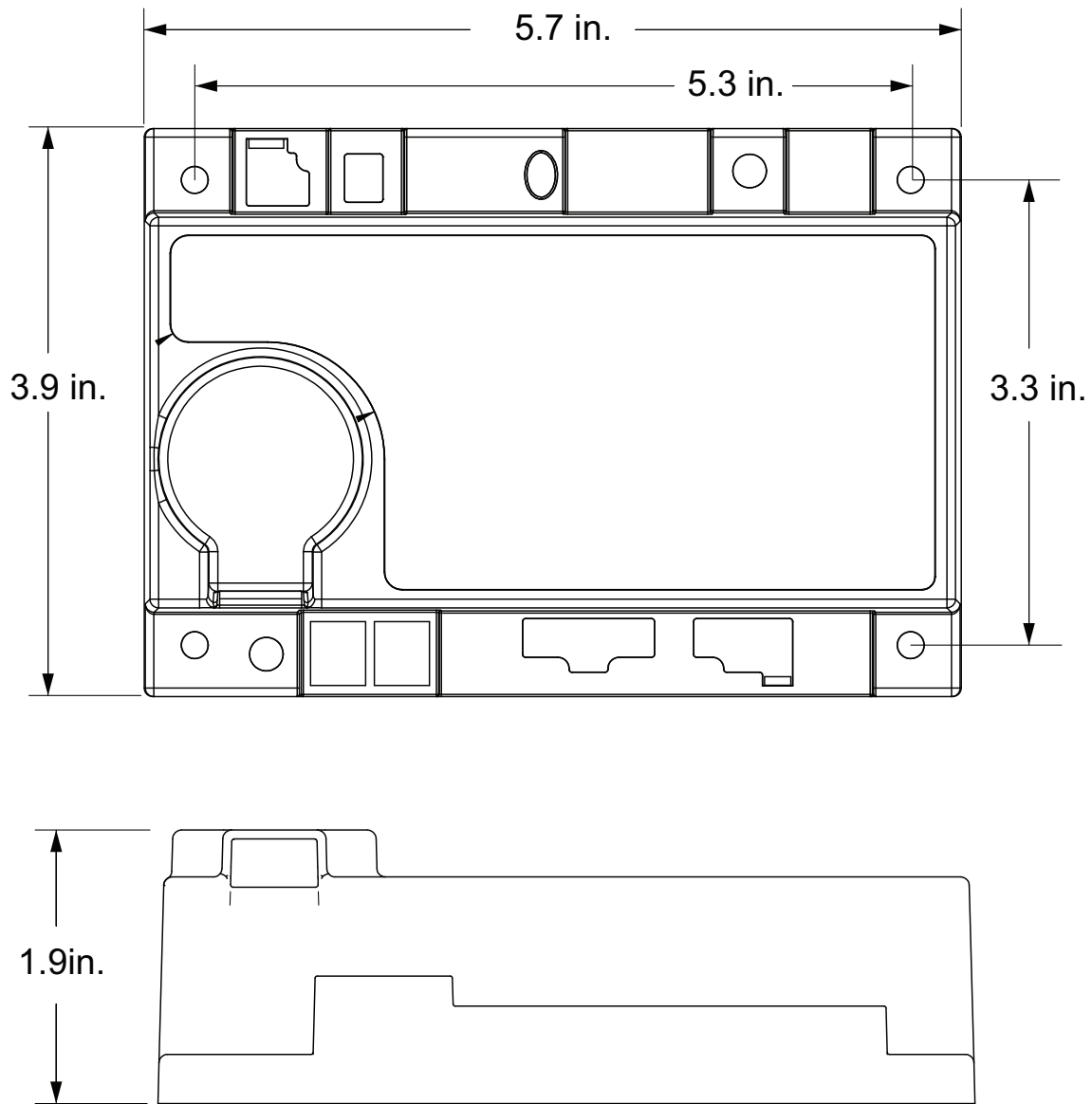


Notes:

- Ceramic insulators must not be in or close to the flame.
- Electrode assemblies must not be adjusted or disassembled. Electrodes are NOT field adjustable.
- Electrodes should have a gap spacing of 0.125 ± 0.031 in (3.12 ± 0.81 mm), unless otherwise specified by the appliance manufacturer. If spacing is not correct, the assembly must be replaced.
- Exceeding temperature limits can cause nuisance lockouts and premature electrode failure.
- Electrodes must be located where they are not exposed during normal operation.

DIMENSIONS

Quick Connect Models



Note: All dimensions are in inches.

Figure 3. Standard Enclosure

PART NUMBER CONFIGURATION

35 – 2 X X X X X – X X X

Description

TRIAL FOR IGNITION

- 0 = NONE
- 1 = 4 SECONDS
- 2 = 5 SECONDS
- 3 = 7 SECONDS
- 4 = 10 SECONDS
- 5 = 15 SECONDS
- 6 = 30 SECONDS
- 7 = 60 SECONDS
- 8 = 90 SECONDS

INTER-PURGE

- 0 = NONE
- 1 = 15 SECONDS
- 2 = 30 SECONDS
- 3 = 45 SECONDS
- 4 = 4 MINUTES

PRE-PURGE

- 0 = NONE
- 1 = 15 SECONDS
- 2 = 30 SECONDS
- 3 = 45 SECONDS
- 4 = 4 MINUTES

TRY FOR IGNITION & FLAME SENSE

- 0 = SINGLE TRY, LOCAL SENSE
- 1 = SINGLE TRY, REMOTE SENSE
- 2 = THREE TRY, LOCAL SENSE
- 3 = THREE TRY, REMOTE SENSE
- 4 = SINGLE TRY, LOCAL SENSE – MANUAL RESET
- 5 = SINGLE TRY, REMOTE SENSE – MANUAL RESET
- 6 = THREE TRY, LOCAL SENSE – MANUAL RESET
- 7 = THREE TRY, REMOTE SENSE – MANUAL RESET
- 9 = SPECIAL, ADVANCED OPTION ID

POST-PURGE (35-21 Only)

- 0 = NONE
- 1 = 15 SECONDS
- 2 = 30 SECONDS
- 3 = 60 SECONDS
- 4 = 90 SECONDS
- 5 = 4 MINUTES
- 9 = SPECIAL, ADVANCED OPTION ID

COMMUNICATIONS

- 0 = NONE
- 9 = SPECIAL, ADVANCED OPTION ID

ENCLOSURE & HV TRANSFORMER

- 0 = NORYL ENCLOSURE HORIZONTAL QC (IP20)
- 1 = INTEGRAL STAND OFFS, HORIZONTAL OR VETICAL QC (IP00)
- 2 = INTEGRAL STAND OFFS, RAJA (IP00)

SERIES & FIELD TERMINALS

- 0 = DIRECT SPARK
- 1 = DIRECT SPARK W/FORCED DRAFT
- 3 = DIRECT SPARK, INTERMITTENT PILOT

EXPORT INFORMATION (USA)

Jurisdiction: EAR
Classification: EAR99

This document contains technical data subject to the EAR.

This literature is provided for informational purposes only. Kidde-Fenwal, LLC believes this data to be accurate, but it is published and presented without any guarantee or warranty whatsoever. Kidde-Fenwal, LLC assumes no responsibility for the product's suitability for a particular application. The product must be properly applied to work correctly. If you need more information on this product, or if you have a particular problem or question, contact KIDDE-FENWAL, LLC, Ashland, MA 01721.

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EU DECLARATION OF CONFORMITY

We

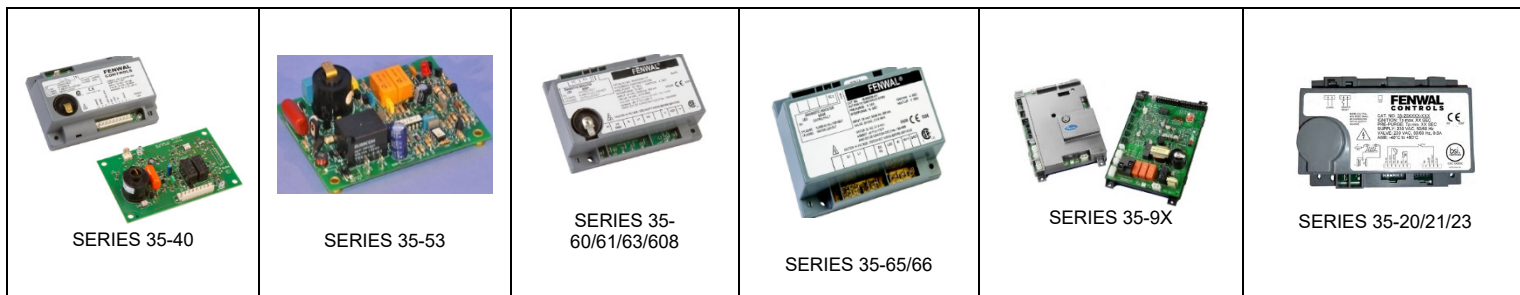
Company Name: Kidde-Fenwal, LLC
 Postal Address: 400 Main Street
 City and Post Code: Ashland, MA 01721
 Tel: 508-881-2000

Declare that the DoC is issued under sole responsibility and belongs to the following product:

Apparatus Model(s): Series 35-40, 35-53, 35-60, 35-61, 35-63, 35-608, 35-65, 35-66, 35-9X
 Type: Fitting
 Batch Number: Date code and Revision Level Assigned per production lot, (YYWW RR)

Object of the Declaration:

Series 35-20, 35-21, 35-23 230Vac Direct Spark Automatic Gas Ignition Controllers
 Series 35-40, 12/24Vdc Direct Spark Automatic Gas Ignition Controllers
 Series 35-53, 12Vdc Direct Spark Automatic Gas Ignition Controllers
 Series 35-60, 35-61, 35-63, 35-608 24Vac Direct Spark Automatic Gas Ignition
 Series 35-65 & 35-66 24Vac Hot Surface Automatic Gas Ignition Controllers
 Series 35-9X Platform Ignition Module



The object of the declaration described above is in conformity within the relevant union harmonization legislation:

| | | | |
|---------------------------|---------------|------------------------|------------|
| Gas Appliance Regulation: | (EU) 2016/426 | Low Voltage Directive: | 2014/35/EC |
| EMC Directive: | 2014/30/EC | Rohs | 2011/65/EU |

The following harmonized standards and technical specifications have been applied:

| | |
|----------------------|---|
| <u>EN298:2022:</u> | Automatic Burner Control systems for Burners and appliances burning gaseous or liquid fuels. |
| <u>EN13611:2019:</u> | Safety and control devices for Gas Burners and Gas burning appliances – General Requirements. |

Name of Notified Body & Number: BSI Group, 2797, EU Type Examination Certification

| | | |
|--------------------------------|------------------------|----------|
| Notified Body Certificate No.: | Series 35-20/21/23 | CE828701 |
| | Series 35-40: | CE682407 |
| | Series 35-53 | CE682404 |
| | Series 35-60/61/63/608 | CE682405 |
| | Series 35-65/66 | CE682406 |
| | Series 35-9x | CE690652 |

Surveillance Audit Notified Body: BSI Group

For copies of the Installation Instructions and the EU DoC, got to www.fenwalcontrols.com, - Document Library - Data sheets.

Paul Finn

Kidde-Fenwal, LLC. Ashland, MA USA
 Place of Issue:

9 Sept 2025
 Date of Issue

Paul Finn, Certification Engineer
 Name