

SERIES 35-66

24 VAC Microprocessor-Based Hot Surface Ignition Control with Inducer Blower Relay

FENWAL
CONTROLS

F-35-66
September 2026

FEATURES

- Safe start with DETECT-A-FLAME® flame sensing technology
- Custom pre-purge and inter-purge timings*
- 120/240 field selectable line voltage for use with 120 VAC igniter option
- 24/120/240 VAC hot surface igniter models available
- 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**

APPLICATIONS

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

DESCRIPTION

The Model 35-66 is a 24 VAC Microprocessor Based Hot Surface Ignition (HSI) Control designed for use in all types of gas-fired appliance where sparking is not desired. The control continually and safely monitors, analyzes and controls the proper operation of the gas burner and inducer blower.

AGENCY CERTIFICATIONS



Design Certified to ANSI Z21.20,
CSA/CAN C22.2 No 199 M89



Factory Mutual approval on select models

RoHS

RoHS Compliant



CE Approved to EN 298:2022***
CE682406



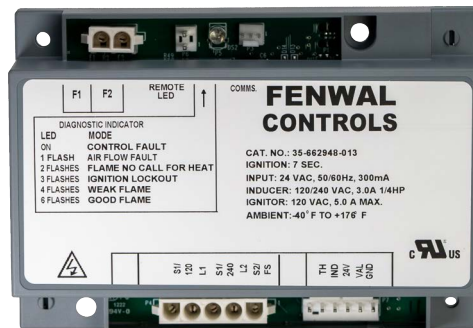
Australian Gas Safety certification to EN
298:2022 & AS 4625-2008

GSC 805641

* 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	Control: 18-30 VAC 50/60 Hz (Class 2 transformer)
HSI Input Voltage	24, 120 or 240 VAC (L1 and L2 only)
Input Current	400(RMS) mA @ 24 VAC, gas valve relays energized @ 25°C
Gas Valve	2.0A @ 24 VAC 4.0A (Inrush)
Hot Surface Ignitor	5A @ 24/120/240 VAC
Inducer Relay	120/240 VAC 3.0/1.5 amps @ .6pf min.
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	0.7uA minimum
Flame Failure Response Rate	0.8 seconds maximum
Flame Failure Lockout Time	Varies by model, 315 seconds maximum
Flame Detector Self-check Rate	< 1 second
Gas Types	Natural, LP, or manufactured
Size (LxWxH) Board Only	5.5 x 3.75 x 1.5 inches (13.97 x 9.53 x 3.8 cm)
Size (LxWxH) with Cover	5.7 x 4.0 x 1.6 inches (14.45 x 10.15 x 4.1 cm)
Enclosure / Mounting	Noryl Gray Cover or Integral standoffs
Moisture Resistance	Conformal coated to operate to 95% R.H. (Non-Condensing) Always avoid direct exposure to water.
Ingress Protection	Not Rated, Protection provided by appliance in which it is installed.
Tries for Ignition	One or Three
Tries for Ignition Periods	4, 7, 10, or 15 seconds
Pre-purge and Inter-purge Timings	None, 15, or 30 seconds Without pre-purge, there is a 2 second start-up delay.

SEQUENCE OF OPERATION / FLAME RECOVERY / SAFETY LOCKOUT

Power Up

During power up the Red LED shall briefly flash ON for around 1 second while the control performs a power on self test and then turns OFF to indicate normal operation.

Start Up - Heat Mode

When a call for heat is received from the thermostat, 24 VAC to TH, the control will check the pressure switch for normally open contacts. The inducer blower is then energized and, once the pressure switch contacts close, an optional pre-purge period begins. Following the pre-purge period, the Igniter is energized for the heat-up period, and then the gas valve is energized for the Trial for Ignition (TFI) period.

When the igniter is de-activated and flame is detected during the TFI, the gas valve and inducer blower remains on. 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, an optional post-purge period will continue before de-energizing the inducer blower.

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 inducer blower will turn off following the optional post-purge period. The LED will repeatedly flash 3 times indicating 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 with the inducer blower on before an additional ignition attempt. The control attempts two additional ignition trials before de-energizing the gas valve and entering lockout. The inducer blower will turn off following the optional post-purge period and the LED will repeatedly flash 3 times.

Flame Failure - Recycle Mode

If the established flame signal is lost from the burner, the gas valve is de-energized and the control proceeds to inter-purge with the inducer blower on 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 and the LED will repeatedly flash 3 times.

Lockout Recovery

Recovery from lockout requires a manual reset by either resetting the thermostat, or removing power 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.

Combustion Airflow Fault

Combustion airflow is continually monitored during an ignition sequence by the pressure switch (PSW terminal). If the pressure switch contacts remain active (closed) for 30 seconds at the start of the ignition sequence without an output signal to the inducer blower, the LED will repeatedly flash 1 time indicating an airflow fault and the

control will remain in this mode with the inducer blower off. If the pressure switch contacts later open while there is still a call for heat and then re-closes, the control will begin the pre-purge period followed by a normal ignition sequence.

If the pressure switch contacts remain open for more than 30 seconds after the inducer blower output is energized the LED will indicate an airflow fault and the control will remain in this mode with the inducer blower on for 30 seconds or the post-purge time at which point the inducer will turn off. The control will enter lockout and continue to repeatedly flash the LED 1 time for airflow fault.

If the airflow signal is lost while the burner is firing, the control will immediately de-energize the gas valve and the LED will indicate an airflow fault. The inducer blower will remain on for the post-purge period and the control continues to monitor the PS input waiting for airflow to return. If proper airflow is detected during the post-purge period, a normal ignition sequence will begin with the pre-purge period. Otherwise, the control will remain in an airflow fault as indicated by the LED with the inducer blower off.

MOUNTING AND WIRING

The 35-66 is not position sensitive and can be mounted vertically or horizontally. The control may be mounted on any surface and fastened with #6 sheet metal screws. The control also supports direct mounting to a standard 4-in. junction box. Secure the control in an area that will experience a minimum of vibration and remain below the maximum ambient temperature of 176°F (80°C).

All connections should be made with UL approved, 105°C rated, 18 gauge stranded wire with .054" minimum insulation thick-ness. Refer to the appropriate wiring diagram when connecting the 35-66 to other components in the system.

Remote Sense Cable Requirements

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

Refer to Fenwal Controls datasheet F-05-1000 for details.

 CAUTION	Label all wires prior to disconnection when servicing or replacing controls. Wiring errors can cause improper and dangerous operation. A functional checkout of a replacement control should always be performed.
 CAUTION	The control must be mounted and located in a manner which protects components from exposure to water (dripping, condensate, spraying, rain). Any control that has been exposed to water must be replaced.
 WARNING	All wiring must be done in accordance with both local and national electrical code, and by a trained service technician. Wiring must be at least #18 AWG /AWM rated for 105°C or higher.
 WARNING	The 35-66 uses voltages of shock hazard potential. Wiring and initial operation must be done by qualified service technician.
 WARNING	Operation outside specifications could result in failure of the Fenwal product and other equipment with injury to people and property.
 WARNING	Do not disconnect any electrical loads while the automatic gas ignition control is powered. Disconnect power prior to installation, service, or replacement of the control with the end use appliance.

TERMINAL DESIGNATIONS

Name	Description	Terminal Type
F1	Inducer Power	1/4" male Q.C. (or 2-pin Mate-N-Lok, P2-1)
F2	Inducer Output	1/4" male Q.C. (or 2-pin Mate-N-Lok, P2-2)
R	24 VAC Power	1/4" male Q.C.
S1 240	240 VAC Ignitor	1/4" male Q.C. (optional)
S1 120	120 VAC Ignitor	1/4" male Q.C. (or 5-pin Mate-N-Lok, P4-5)
L1	120/240 VAC Input (Hot)	1/4" male Q.C. (or 5-pin Mate-N-Lok, P4-4)
L2	Neutral	1/4" male Q.C. (or 5-pin Mate-N-Lok, P4-2)
S2 / FS	Ignitor / Remote Flame Sense	1/4" male Q.C. (or 5-pin Mate-N-Lok, P4-1)
TH/W	Thermostat Input	1/4" male Q.C.
PSW	Pressure Switch Input	1/4" male Q.C.
MV1	Main Valve Power	3/16" x .031" male Q.C.
GND	Ground	3/16" x .031" male Q.C.
G	Comm. GND	.100 pin (3)

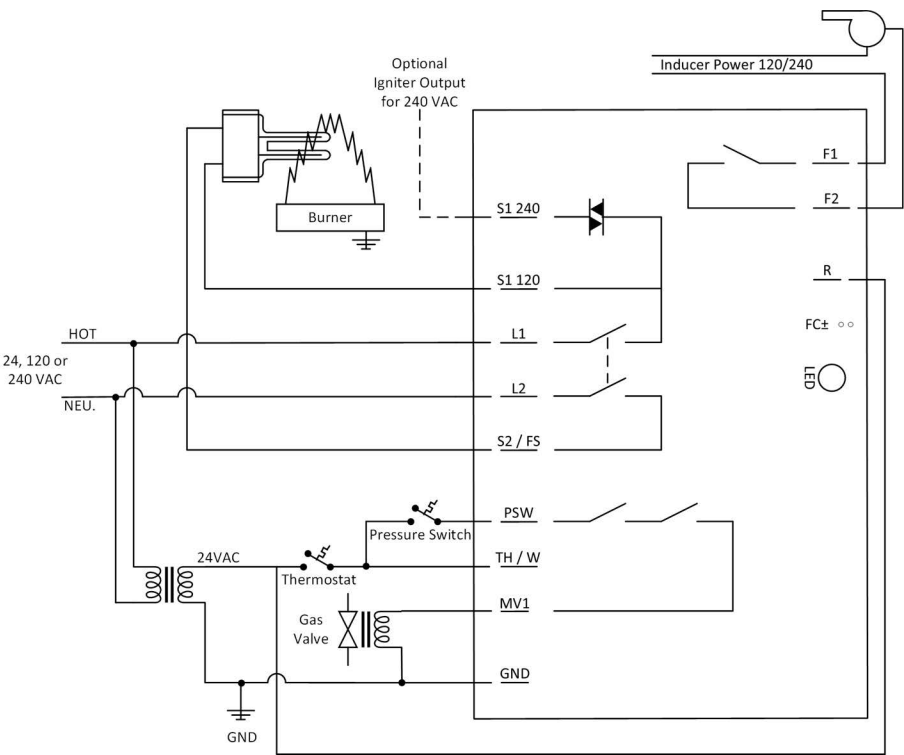


Figure 1. Local Sense

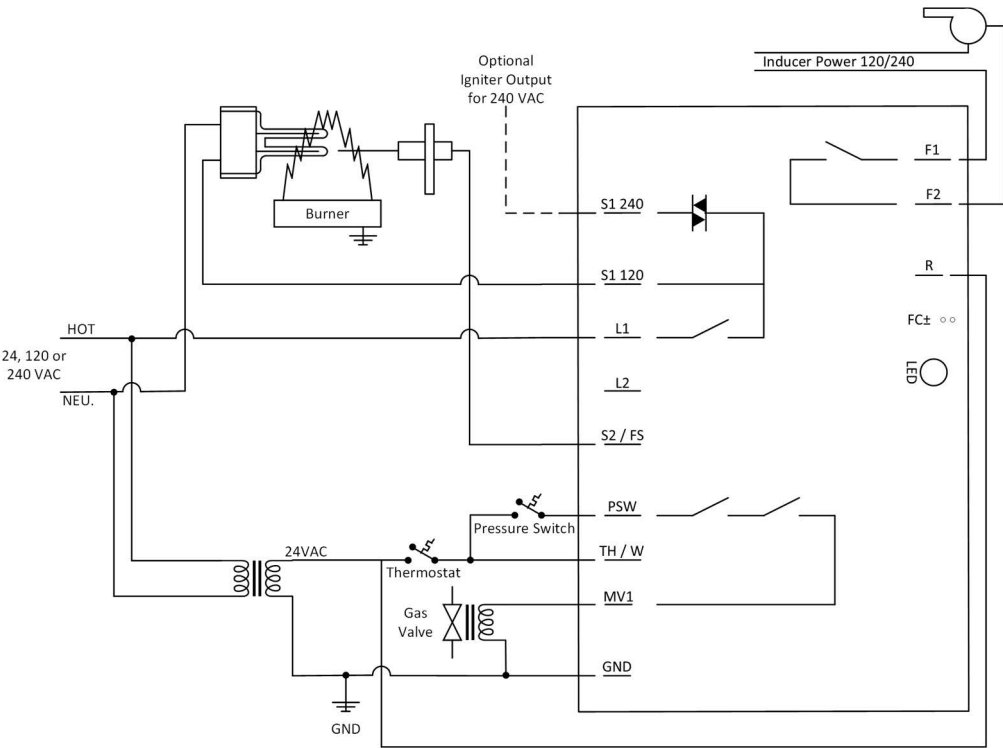


Figure 2. Remote Sense

DIMENSIONS - INTEGRAL STANDOFF

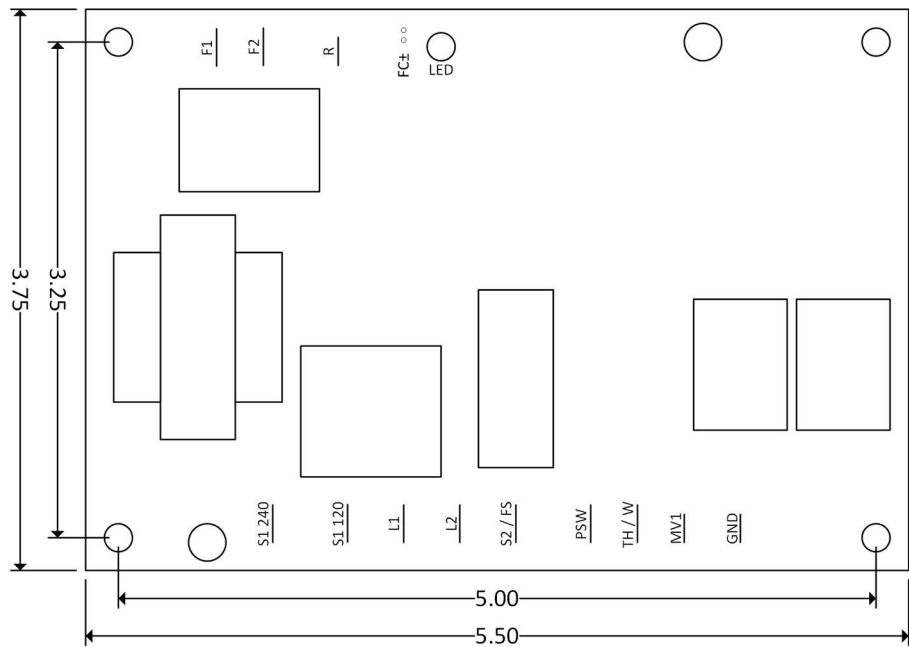


Figure 3. Board Only

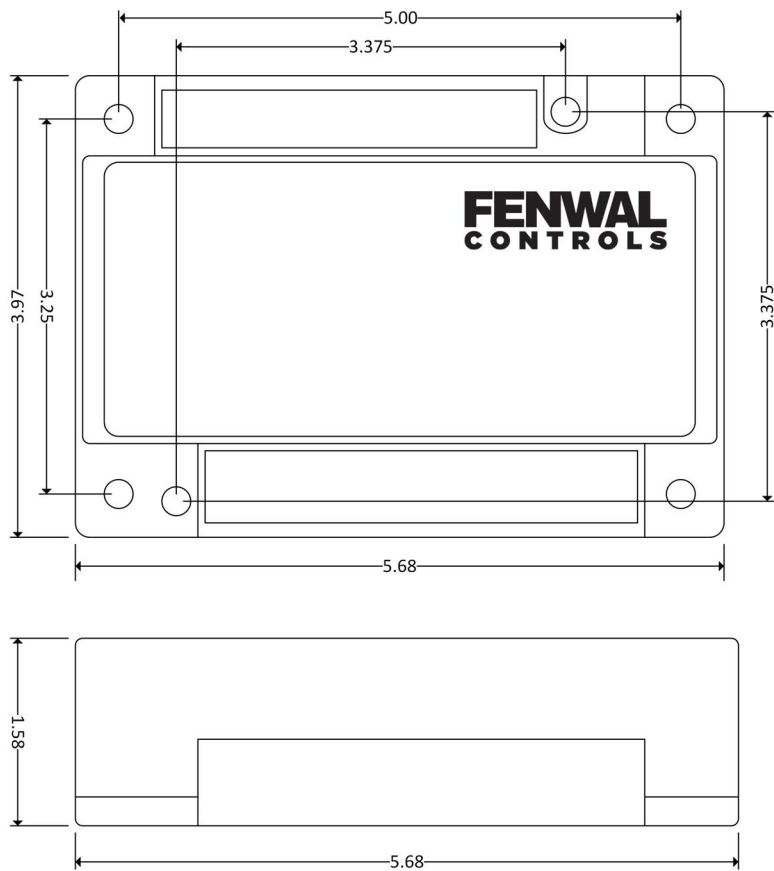


Figure 4. Control with Cover

TROUBLESHOOTING



WARNING

Risk of Explosion or Fire

The 35-66 control cannot be serviced by the user. If any control faults are detected, the 35-66 control must be replaced by qualified service personnel. Risk of explosion or fire can result if the control module has been opened or with any attempts to repair it, and the warranty is void.

Do not use aluminum wire, this can also lead to risk of fire.

Troubleshooting Guide	
Symptom	Recommended Actions
1. Dead	A. Miswired B. Transformer bad/battery fault C. Fuse/circuit breaker fault D. No voltage at PWR E. Faulty control
2. Thermostat on - no ignition	A. Miswired B. Faulty thermostat, no voltage at thermostat terminal W C. Failed igniter
3. Inducer blower on - no TFI after purge delay	A. Miswired B. Flame fault C. Airflow fault D. Faulty control
4. Valve on - no igniter	A. Miswired B. Defective igniter C. Open S1 cable D. Faulty control
5. Igniter on - no valve	A. Valve coil open B. Open valve wire C. Faulty control (check voltage between MV1 and GND)
6. Flame okay during TFI - no flame sense (after TFI)	A. Faulty igniter B. Faulty S1 wire C. Poor ground at burner D. Faulty control (check flame current)

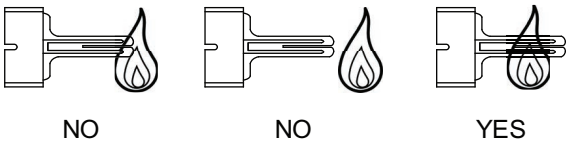
Fault Conditions	
LED Indication	Fault Mode
Off	Standby & Normal Condition
Steady On	Internal Control Failure
2 Flashes	False Flame
3 Flashes	Ignition Lockout

Note: Removing the 24 VAC power from the control will clear the fault code.

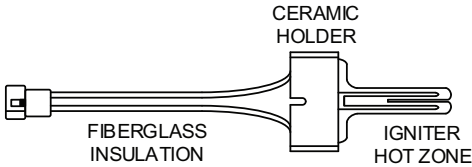
Hot Surface Igniter

Proper location of the silicon hot surface igniter is important to achieve optimum system performance for both ignition and flame sensing. See figure below.

Note: The temperature of the ceramic holder should not exceed the manufacturer's specifications.



Typical Hot Surface Igniter



Flame Current

Flame current is the current which passes through the flame from the sensor to ground to complete the primary safety circuit. To measure flame current, connect a True RMS or analog DC micro-ammeter to the FC+ and FC- terminals. Readings should be 1.0 μ A DC or higher. If the meter reads negative or below "0" on scale, meter leads are reversed. Re-connect leads with proper polarity.

Alternately, a Digital Voltmeter may be used to measure DC voltage between FC+ and FC- terminals. Each micro-amp of flame current produces 1.0 VDC. For example, 2.6 VDC equates to 2.6 μ A.

A good burner ground that matches the control ground is critical for reliable flame sensing.

Internal Control Failure

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

Note: The control can only be replaced with the same model type control.

EU DECLARATION OF CONFORMITY

We

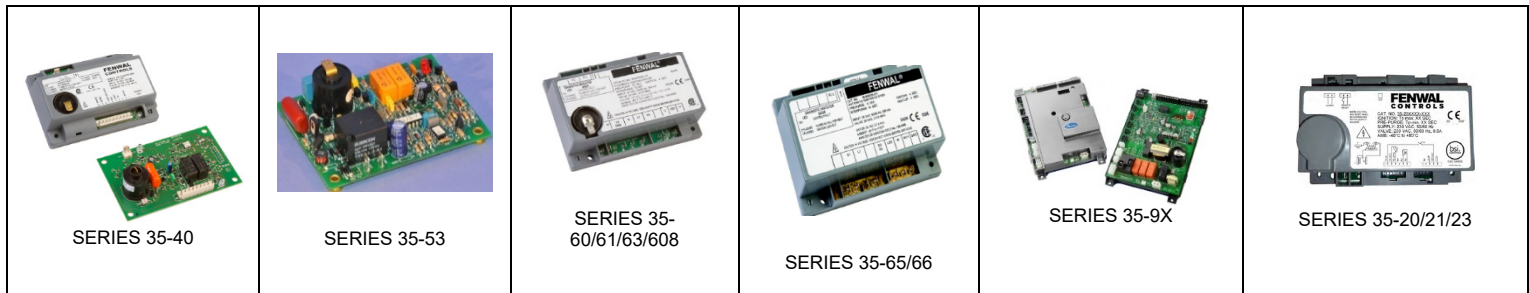
Company Name: Kidde-Fenwal, LLC
Postal Address: 400 Main Street
City and Post Code: Ashland, MA 01721
Tel: 508-881-2000

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