

Type 3738-50 Electronic Limit Switch

With optional solenoid valve

With FOUNDATION™ fieldbus communication

SAMSON

Application

Electronic limit switch for on/off applications to indicate the end position. Optionally with integrated solenoid valve.

CE Ex certified

Special features

- Automation of on/off valves
- Limit switch and optional integrated solenoid valve united in a compact housing or with commercially available external solenoid valves (Ex ia, Ex ic)
- Proven operation concept already used in Series 373x Positioners: menu-driven, on-site operation using one rotary pushbutton, display easy to read in any mounting position
- Trouble-free integration into existing systems
 - Forced venting 24 V DC
 - Intrinsically safe version
- Compact mounting and simple operation
- Contactless, wear-free travel sensor
 - Magneto-resistive sensor
 - No adjustment work necessary
 - Stable measured data and drift-free switching points
 - High level of accuracy
- Electronic limit switch powered over by FOUNDATION™ fieldbus (solenoid valve with low energy consumption of 6 V DC)
- Automatic initialization
- Certified safety, use in safety-instrumented systems according to IEC 61508
- Diagnostic functions
 - Partial stroke test (PST)
 - Travel vs time diagram
 - Movement counter
 - Operating hours counter
 - Dead time and transit time measurement

Type 3738-20 Electronic Limit Switch with NAMUR contacts, see Data Sheet ▶ T 8390



Fig. 1: Type 3738 Electronic Limit Switch with open cover



Fig. 2: Type 3738 mounted on a piston actuator



Fig. 3: Type 3738 mounted on a linear actuator

Versions

– Type 3738-50-xxx4x00xxx000 Electronic Limit Switch with integrated solenoid valve

The solenoid valve is integrated into the housing of the electronic limit switch. The electronic limit switch and the solenoid valve are powered by the connected FOUNDATION™ fieldbus two-wire cable according to IEC 61158-2.

The electronic limit switch can optionally be fitted with a **forced venting function**. This function is activated when the solenoid valve is de-energized after the power supply is interrupted, causing the actuator to move the control valve to its fail-safe position.

– Type 3738-50-xxx0x00xxx000 Electronic Limit Switch with external solenoid valve

The electronic limit switch and the external solenoid valve are powered by the connected FOUNDATION™ fieldbus two-wire cable according to IEC 61158-2.

The electronic limit switch can optionally be fitted with an

optional **forced venting function**. This function is activated when the solenoid valve is de-energized after the power supply is interrupted, causing the actuator to move the control valve to its fail-safe position.

Principle of operation

The electronic limit switch is designed for attachment to pneumatic actuators. The angle of rotation is measured without contact using a magnet (on a screw) positioned centrally on the actuator shaft. The screw with magnet does not need to be adjusted. The AMR (anisotropic magnetoresistive) sensor located in the device together with the measuring electronics (1) can detect the directional change of the applied magnetic field and, as a result, sense the rotation of the actuator.

The actuator is operated by a solenoid valve (6, 8) which converts the signal issued by the control system into a binary pressure signal.

Functional diagram

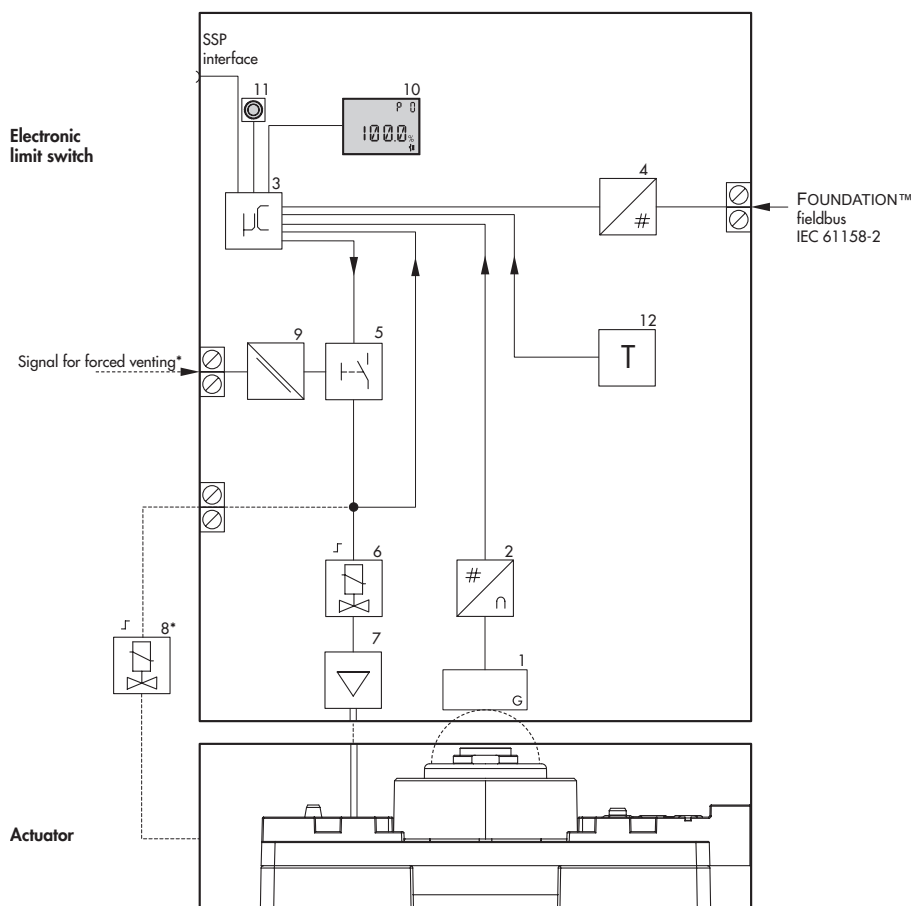


Fig. 4: Functional diagram – Type 3738-50-xxx0xxxxx and Type 3738-50-xxx4xxxx

- | | | | |
|---|---|----|--|
| 1 | AMR sensor with electronics | 7 | Air capacity booster (Type 3738-50-xxx4x00xxx000) |
| 2 | A/D converter | 8* | External solenoid valve (Type 3738-50-xxx0x00xxx000) |
| 3 | Microcontroller | 9 | Electrical isolation |
| 4 | Interface module (IEC 61158-2) | 10 | Display |
| 5 | Actuation of forced venting | 11 | Rotary pushbutton |
| 6 | Solenoid valve (Type 3738-50-xxx4x00xxx000) | 12 | Temperature sensor |
| | | * | Optional |

Operation

A rotary pushbutton and LC display are used to operate the electronic limit switch on site. The functions for start-up, display readings and service functions are set over Codes (P0 to P28). When a fault occurs, a corresponding error code appears on the display.

SAMSON's TROVIS-VIEW can be used to operate the electronic limit switch. An SSP interface on the electronic limit switch allows it to be connected to a computer using an adapter cable.

The connection to the FOUNDATION™ fieldbus network allows the electronic limit switch to be started up from the control room. Optionally, the communication tools Enhanced Device Description (EDD) or Device Type Manager (DTM) can be implemented.

Mounting

- The electronic limit switch can be mounted on a **linear actuator**, e.g. Type 3271 Pneumatic Actuator (**NAMUR attachment**). Depending on the diaphragm area, various mounting parts are available (refer to Table 4).
- The electronic limit switch is mounted according to **VDI/VDE 3845**, fixing level 1 (2010) on **rotary actuators** using a mounting platform. Various mounting parts (accessories) are available depending on the shaft height of the rotary actuator (refer to Table 4).

Pneumatic connections

The pipes and screw fittings must be mounted properly. They must be checked for leaks and damage at regular intervals and, if necessary, repaired. Before performing any repair work, air lines to be opened must be depressurized.

G 1/4 or 1/4 NPT threaded ports (depending on the device version) are used to connect the air pipes. Water and dirt is prevented from entering the exhaust ports or vent plugs by installing a filter or by other suitable measures.

Operation with pressure reducing valves: The K_{VS} coefficient of an upstream pressure reducing valve must be at least 1.6 times larger than that of the device.

Air pipe: The minimum nominal size of the air pipe must be a pipe with an inside diameter of ≥ 4 mm. A larger nominal size must be used for connection lengths longer than 2 m.

Operation with external solenoid valve: The input pressure at the external solenoid valve must not exceed the maximum supply pressure (refer to the specifications given by the solenoid valve manufacturer).

Electrical connections

The bus cable is directly connected to the bus terminals. Besides supplying the communication signal, this cable powers the microprocessor and solenoid valve.

Cable entry

The threaded connection for the terminal compartment is designed with an M20 x 1.5 thread.

The screw terminals are designed for wire cross-sections of 0.2 to 1.5 mm². Tighten by at least 0.5 Nm.

Use in safety-instrumented systems

Emergency venting: when the optional emergency shutdown function is used, an interrupted voltage signal (24 V) at terminals 87/88 causes the bus-powered integrated or external solenoid valve to be de-energized, venting the mounted actuator. The function is suitable for the use in safety-instrumented systems according to IEC 61508.

The emergency venting function is not affected by the software or the selected device parameters.

Table 1: Technical data of the electronic limit switch







| | | | |
|---------------------------------|--|--|---|
| Type | 3738-50-xxx4x00xxx000 | 3738-50-xxx0x00xxxx00 | |
| Version | With integrated solenoid valve | For external solenoid valve | |
| Permissible range of rotation | Min.: 0 to 30° · Max.: 0 to 170° | | |
| Communication | Local | SAMSON SSP interface with serial interface adapter with TROVIS-VIEW with database module 3738-50 | |
| | Bus | FOUNDATION™ fieldbus | |
| Supply air | | 2.4 to 8 bar | Same as specifications of the solenoid valve manufacturer |
| | Air quality | Acc. to ISO 8573-1 edition 2004 Max. particle size and density: Class 4 Oil content: Class 3 Pressure dew point: Class 3 or at least 10 K below the lowest ambient temperature to be expected | Same as specifications of the solenoid valve manufacturer |
| | Air consumption | In neutral position: <60 l/h In switching position: <30 l/h | |
| Electric power supply | Powered by FOUNDATION™ fieldbus | | |
| Permissible ambient temperature | -25 to 80 °C | -40 to 80 °C | Metal cable glands must be used for ambient temperatures below -20 °C. The limits specified in the examination certificate additionally apply. |
| Influences | Temperature | ±0.7 %/90° angle above the permissible temperature range | |
| | Influence of vibrations | 0.25 % up to 2500 Hz and 4 g according to IEC 770 | |
| Electromagnetic compatibility | Complying with EN 61000-6-2, EN 61000-6-3, EN 61326-1 and NAMUR Recommendation NE 21 | | |
| Electrical connections | | M20 x 1.5 cable gland(s) for 6 to 12 mm clamping range, screw terminals for 0.2 to 2.5 mm ² wire cross-sections | |
| | *Without forced venting | One cable gland | Two cable glands |
| | *With forced venting | Two cable glands | Three cable glands |
| Explosion protection | See Table 3 | | |
| | Type 3738-50-000... | Without | |
| | Type 3738-50-110... | II 2G Ex ia IIC T6 and II 2D Ex ia IIIC T80°C IP66 | |
| | Type 3738-50-810... | II 3G Ex ic IIC T4 and II 3G Ex nA II T4 and II 3D Ex tc IIIC T80°C IP66 | |
| Degree of protection | IP 66 | | |
| Materials | Housing | Die-cast aluminum EN AC-ALSi12(Fe) (EN AC-44300) acc. to DIN EN 1706, powder paint coated | |
| | Housing cover | PC | |
| | Cover gasket | PU | |
| | Indicating wheel | PC | |
| | Magnet material | Hard ferrite | |
| Weight | Approx. 1.2 kg | Approx. 1.0 kg | |
| Compliance |  | | |

Table 2: Technical data of solenoid valve

| Integrated solenoid valve (Type 3738-50-xxx4x00xxx000) | |
|---|---|
| Version | 3/2-way or 5/2-way function Function determined by the position of the molded seal |
| K _{V5} coefficient | 0.32 |
| Service life | 1,000,000 switching cycles |
| Temperature range (operation) | -25 to +80 °C |
| External solenoid valve (Type 3730-50-xxx0x00xxx000) | |
| Read manufacturer's specifications! | |
| 6 V DC, max. 18 mW | |

Table 3: Explosion protection certificates

| Type | Certification | | | Type of protection/comments |
|---|---|--------------------|---|---|
| 3738-50 |  EC type examination certificate | No. | PTB 08 ATEX 2039 X | II 2G Ex ia IIC T6; II 2D Ex ia IIIC T80°C IP66 |
| | | Date | 2012-02-02 | |
| |  | No. | RU C-DE.08.B.00114 | IEx ia IIC T6/T5/T4 Ga X; Ex tb IIIC T80°C Db X |
| | | Date | 2013-11-15 | |
| | | Valid until | 2018-11-14 | |
|  EC type examination certificate | No. | PTB 08 ATEX 2039 X | II 2G Ex eb[ia] IIC T4; II 2D Ex tb IIIC T80°C IP66 | |
| | Date | 2012-02-02 | | |
|  | No. | RU C-DE.08.B.00114 | IEx e [ia] IIC T4 Gb X; Ex tb IIIC T80°C Db X | |
| | Date | 2013-11-15 | | |
| | Valid until | 2018-11-14 | | |
|  EC type examination certificate | No. | PTB 08 ATEX 2039 X | II 3G Ex ic IIC T4; II 3G Ex nA II T4 Gc; II 3D Ex tc IIIC T80°C IP66 | |
| | Date | 2012-02-02 | | |

Electrical connections

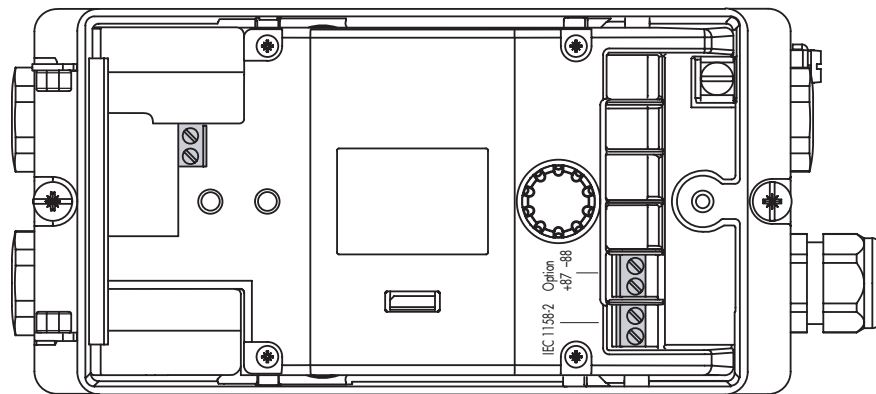


Fig. 5: Version with integrated solenoid valve (Type 3738-50-xxx4x00xxx000)

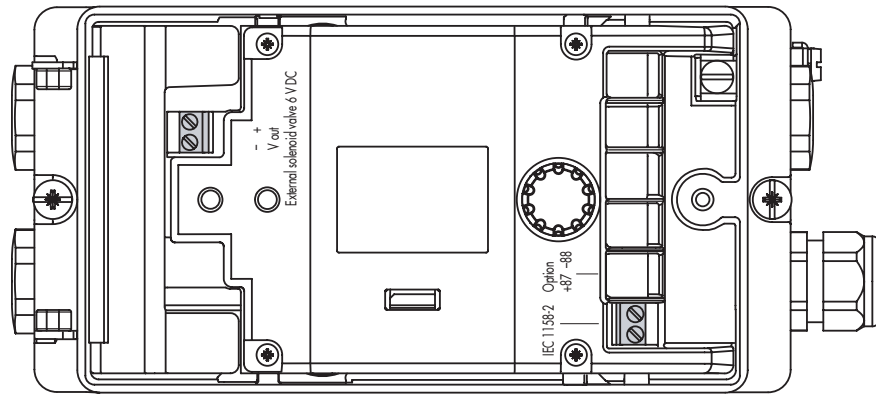


Fig. 6: Version with external solenoid valve (Type 3738-50-xxx0x00xxx000)

Dimensions in mm

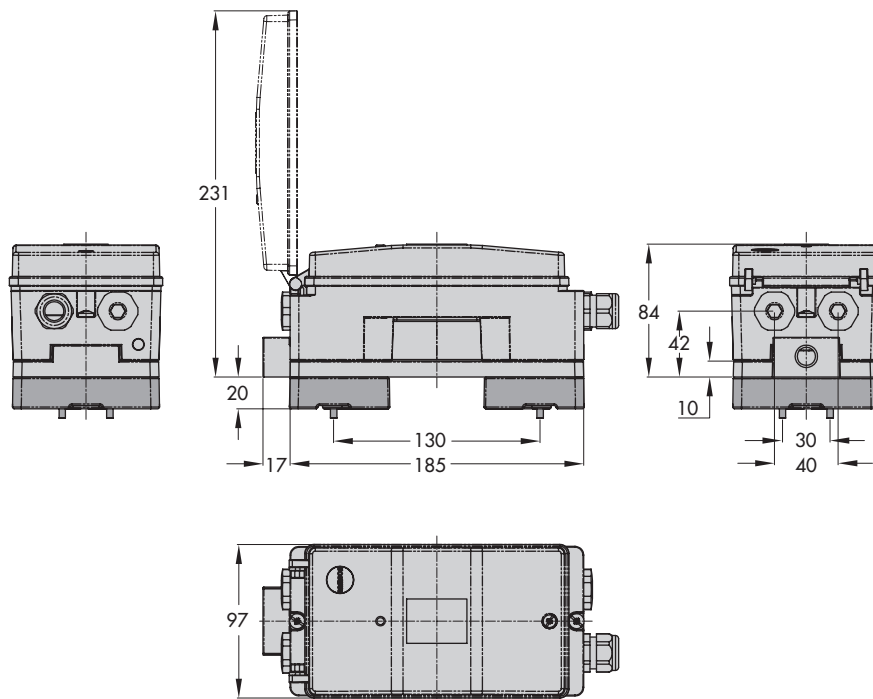


Fig. 7: Dimensional drawing for Type 3738 Electronic Limit Switch

Article code

| Electronic Limit Switch | Type 3738-50- | | | | | | | | | | | | | |
|---|---------------|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | x | x | x | x | x | 0 | x | x | 1 | x | 0 | 0 | x | 0 |
| With LCD | | | | | | | | | | | | | | |
| Explosion protection | | | | | | | | | | | | | | |
| Without | 0 | 0 | 0 | | | | | | | | | | | |
| II 2G Ex ia IIC T6; II 2D Ex ia IIIC T80°C IP66 | 1 | 1 | 0 | | | | | | | | | | | |
| II 2G Ex eb[ia] IIC T4; II 2D Ex tb IIIC T80°C IP66 | 3 | 1 | 0 | | | | | | | | | | | |
| II 3G Ex ic IIC T4; II 3G Ex nA II T4 Gc; II 3D Ex tc IIIC T80°C IP66 | 8 | 1 | 0 | | | | | | | | | | | |
| Solenoid valve | | | | | | | | | | | | | | |
| External, bus-powered | | | | | 0 | | | | | | | | | |
| Integrated, bus-powered | | | | | 4 | | | | | | | | | |
| Options | | | | | | | | | | | | | | |
| Without | | | | | 0 | | | | | | | | | |
| Emergency shutdown | | | | | 1 | | | | | | | | | |
| Company version | | | | | | | | | | | | | | |
| SAMSON | | | | | | | | 0 | | | | | | |
| AIR TORQUE | | | | | | | | 1 | | | | | | |
| Cover | | | | | | | | | | | | | | |
| Gray beige | | | | | | | | 0 | | 0 | | | | |
| Black | | | | | | | | 0 | | 1 | | | | |
| Silver gray | | | | | | | | 1 | | 3 | | | | |
| Special applications | | | | | | | | | | | | | | |
| Without | | | | | | | | | | | | | | 0 |
| Version compatible with paint | | | | | | | | | | | | | | 1 |
| Special version | | | | | | | | | | | | | | |
| Without | | | | | | | | | | | | | | 0 |

Table 4: Accessories

| | Order no. |
|---|-----------|
| Attachment to linear actuators (NAMUR attachment) | |
| Version with integrated solenoid valve G ¼ | 1402-0540 |
| Version with integrated solenoid valve ¼ NPT | 1402-0541 |
| Version for external solenoid valve G ¼ | 1402-0542 |
| Version for external solenoid valve ¼ NPT | 1402-0543 |
| Plus mounting parts for Type 3271 Actuator Version up to 700 cm ² | – |
| 1400-60 and 2800-120 versions | 1402-0544 |
| 2800-30 and 2800-60 versions | 1402-0545 |
| Attachment to rotary actuators acc. to VDI/VDE 3845, fixing level 1 (2010) | |
| Attachment (20 mm shaft height) | 1400-9859 |
| Attachment (30 mm shaft height) | 1400-9860 |
| Attachment (50 mm shaft height) | 1400-9861 |
| Attachment (50 mm shaft height, 88 mm shaft diameter), e.g. Pfeiffer Type 31b, 2000 size | 1402-0332 |
| Mounting platform (black) G ¼ | 1380-1266 |
| Mounting platform (black) ¼ NPT | 1380-1268 |
| Mounting platform (black) with piping as required G ¼ | 1380-1738 |
| Mounting platform (black) with piping as required ¼ NPT | 1380-1739 |
| Cable glands (M20 x 1.5) | |
| Nickel-plated brass | 1880-4875 |
| Stainless steel 1.1305 | 8808-0160 |
| Version for Ex i: black plastic | 8808-0180 |
| Version for Ex i: blue plastic | 8808-0181 |
| TROVIS-VIEW Configuration and Operator Interface software | |
| TROVIS-VIEW with device module 3738-50 (free download from www.samson.de) | |
| Serial interface adapter (SAMSON SSP interface to RS-232 port on a PC) | 1400-7700 |
| Isolated USB interface adapter (SAMSON SSP interface to USB port on a PC) | 1400-9740 |

Ordering text

| | |
|-------------------------|---------------------|
| Electronic limit switch | Type 3738-50 |
| Explosion protection | With/without |
| Solenoid valve | Integrated/external |
| Company version | SAMSON/AIR TORQUE |
| Housing cover version | See article code |
| Special applications | |
| Mounting accessories | |
| TROVIS-VIEW | |

Specifications subject to change without notice



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