

## **ADDRESSABLE GLASSBREAK DETECTOR INSTRUCTION MANUAL**

### **DESCRIPTION**

S2000-ST Addressable Glassbreak Detector is an acoustic detector designed to sense and to recognize breaking of common window or filmed glass, generating an alarm signal and transmitting it to a safety system controller. S2000-ST detects breaking of glass being from 2.5 to 8 mm in thickness and at least 0.1 square meters, one side being at least 0.3 m in length.

S2000-ST detector is powered and transmits alarm signals if happened through the 2-wire addressable multiplex loop being the part of Orion safety system and controlled by S2000-KDL controller. Consult the S2000-KDL controller instructions for compatibility.

The detector provides high noise immunity and doesn't generate false alarms while affected by:

- RFI of 150 ÷ 175 MHz below 40 W farther then 3 m from the detector microphone,
- nondestructive physical shocks onto the protected glass,
- harmonic sound signals with sound pressure below 70 dB.

The detector is equipped with cover tamper switch providing generating a tamper alarm in case of enclosure opening.

The detector is easy to maintain and can be mounted on walls, or on ceiling, or between the protected glass and a window covering (blinds, curtains and so on).

S2000-ST module is designed for a round-the-clock operation.

### **FEATURES**

- Capacitor electret-foil microphone
- Two-band frequency range signal detecting
- Multilevel algorithm of intelligent treatment
- Operating power and bidirectional communication with controller via two-wire addressable multiplex loop
- Up to 30 detectors being supervised by a two-wire loop controller
- Low current consumption
- High false alarm immunity
- Shockproof
- Failure-proof
- Tamperproof
- Programming one of four sensitivity levels which are computer-generated adjusted in manufacturing
- Address programming by means of net controller command and storing the programmed address in the nonvolatile memory
- Test Mode availability accompanied with LED indicating
- Surface Mounted Technology PCB
- Modern design
- 18 month Warranty

## SPECIFICATIONS

|                              |                                                        |
|------------------------------|--------------------------------------------------------|
| Range                        | 6 m                                                    |
| Number of Actual Frequencies | 2 (the first is high while the second is low)          |
| Maximum Consuming Current    | 2 mA                                                   |
| Power Supply                 | from S2000-KDL via two-wire addressable multiplex loop |
| Power-Up Operation Readiness | 10 s maximum                                           |
| Operating Temperature Range  | –10 C to +45 C                                         |
| Relative Humidity            | up to 90% (for +25 C) non-condensing                   |
| Ingress Protection Rating    | IP30                                                   |
| Overall Dimensions           | 75×65×25 mm                                            |
| Weight                       | about 100 g                                            |

## S2000-ST DESIGN AND OPERATING PRINCIPLE

S2000-ST detector is made with plastic enclosure having movable front cover locking by means of latch. Within the detector there is a PCB with surface mounted:

- Terminal Blocks the addressable multiple loop wires to be connected to,
- Four DIP Switches to control the detector operating modes and sensitivity level (see Table 1),
- Tamper Switch with normally closed contacts.

**Table 1: Dip Switch Control**

| DIP Switch | Position | Settings             |                | Remark                                           |
|------------|----------|----------------------|----------------|--------------------------------------------------|
| #4         | –        | –                    |                | Reserved                                         |
| #3         | ON       | Test Mode            |                |                                                  |
|            | OFF      | Operating Mode       |                |                                                  |
| #1, #2     | ON, ON   | Detector Sensitivity | 15 dB, minimum | Sensitivity variation for first (high) frequency |
|            | OFF, ON  |                      | 10 dB          |                                                  |
|            | ON, OFF  |                      | 5 dB           |                                                  |
|            | OFF, OFF |                      | 0 dB, maximum  |                                                  |

S2000-ST detector has a capacitor electret-foil microphone with built-in preamplifier as a sensor. The microphone converts sound waves received into electric signals being then treated by dual-channel analog processing and amplified. Then signals are transmitted into microprocessor which implements its discrete filtering, then analyses, and makes a decision about intrusion alarm condition having occurred.

A signal having been interpreted as glass breaking, the INTRUSION ALARM message is transmitted to the S2000-KDL controller.

If the front cover is being opened, the tamper switch contacts are opened and TAMPER ALARM message is transmitted to the S2000-KDL controller.

## S2000-ST OPERATING MODES

S2000-ST detector is designed to support four different ways of operation such as

- Test Mode
- Normal or Operating Mode
- Intrusion Alarm Mode
- Tamper Alarm Mode

**Test Mode** is intended for checking the detector proper operability and sensitivity level set adequacy. LED indication is automatically enabled in Test Mode to indicate correct functionality. See TESTING THE DETECTOR for more information.

Being in **Normal Mode**, the S2000-ST detector processes acoustic signals being received, responding NORM message to the S2000-KDL controller. The LED indication is disabled.

A received signal having been recognized as glass breaking, the detector enters the **Intrusion Alarm Mode**, transmitting the corresponding message to the S2000-KDL controller. The detector LED is not lighting.

In case of opened enclosure the detector enters the **Tamper Alarm Mode** and transmits the TAMPER ALARM message to the S2000-KDL controller. The detector LED is not lighting too.

## S2000-ST LED INDICATION

The S2000-ST detector does NOT illuminate its LED on power-up or while operating. LED is automatically enabled only in Test Mode (see Table 2).

After applying power and before the first data transaction via addressable multiplex loop LED is lit steady, the consuming current happening to exceed specified one.

Table 2: LED Indication

| Detector Mode | Indicator Behavior | Remark                                                              |
|---------------|--------------------|---------------------------------------------------------------------|
| Operating     | OFF                |                                                                     |
| Alarm         | OFF                |                                                                     |
| Test          | Single flashing    | No test signals                                                     |
|               | Double flashing    | A test signal having been registered, double flashing begins in 1 s |

## DELIVERY SET

|                    |       |
|--------------------|-------|
| S2000-ST Detector  | 1 pc  |
| Instruction Manual | 1 pc  |
| Screw-nail         | 2 pcs |
| Dowel              | 2 pcs |
| Package            | 1 pc  |

## WIRING THE DETECTOR

Refer to wiring diagram in Figure 1. After connecting the two-wire multiplex loop, allow 10 seconds for the detector to stabilize before testing.

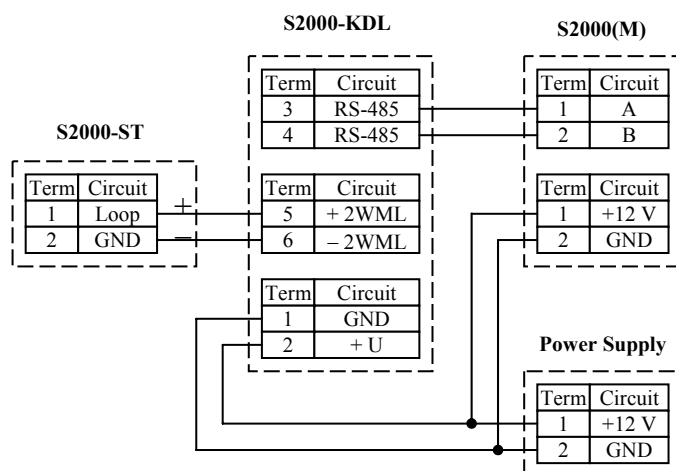


Figure 1: S2000-ST Detector Wiring Diagram

## S2000-ST ADDRESS PROGRAMMING

Connecting a S2000-ST detector to a S2000-KDL controller, it is necessary to assign this one with a unique address number identifying it within the two-wire addressable multiplex loop.

Net address is stored in the S2000-ST detector non-volatile memory. A S2000-ST comes with factory preset address value of 127.

In order to change the network address, connect the S2000-KDL with S2000-ST connected to a S2000/S2000M console or ARM Orion PC through RS-485 interface.

There are two software features to change a device address; those are ADDRESS PROGRAMMING command and CHANGE ADDRESS command.

By means of ADDRESS PROGRAMMING command it is possible to supply a device with required address in case of its current address being unknown. This feature also is useful when the same address is assigned by mistake to two or more devices. In order to implement such operation, activate the command in question with required net number ranged from 1 to 127 as parameter. Then make the *long-long-long-short* pressing on the detector tamper switch. The term “long” signifies keeping during at least 1 s, while “short” one signifies pressing within no more than 1 s, the pause between pressings not exceeding 1 s. The address having been changed, the detector LED will flash triply and the console/computer will display the messages reporting missing the device with old address and then detecting the device with new address. If two detectors had the same address before programming then the computer will not display the detector with former address having been disconnected.

In order to change one known specified address to another one select CHANGE ADDRESS command with current and new S2000-ST net numbers (ranged from 1 to 127) as parameters. The address having been set, the console/computer will display the messages reporting missing the device with old address and then detecting the device with new address.

Finally, write the assigned address on a label and attach the label to the S2000-ST detector.

Refer to S2000-KDL, S2000/S2000M, or ARM Orion User's Manuals for more detailed information.

## ON RECEIPT

After transportation or storage under low temperature conditions unpack the detector and wait for two hours before operating.

Ensure the detector serial number and shipment data correspond with those pointed in acceptance certificate.

Make visual inspection of the detector. The detector must be free from any mechanical damage. Shake the detector to ensure there are no any detached components or foreign particles within it. Make sure the manufacturer PCB seals are available and uninjured.

Next, ensure the detector consumed current doesn't exceed the declared value. To do this:

- Remove the front cover and connect the detector to a S2000-KDL controller through a milliamperemeter (see WIRING THE DETECTOR). If several devices are connected to the S2000-KDL controller assign the unique address number to the detector in question (see S2000-ST ADDRESS PROGRAMMING).
- Set DIP switch #3 to OFF and both DIP switches #1 and #2 to OFF too, providing Operating Mode and maximum sensitivity correspondently.
- Power up the detector and allow ten seconds for the detector stabilize. Then measure the consumed current and make sure it is within range specified.

Finally, inspect the proper detector functionality, that is sensing, message generating and LED indication, as described below (see TESTING THE DETECTOR).

In the event of any above-noted inspection procedure having been failed the detector is to be rejected as defective and returned to the manufacturer for being exchanged.

## TESTING THE DETECTOR

To test the detector proper functionality:

- Remove the S2000-ST front cover and connect the detector to a S2000-KDL controller and Orion net controller as shown in Figure 1
- Place the powered off detector in Test Mode by setting DIP switch #3 to ON position and put on the front cover
- Power up the detector
- Make sure LED is flashing once every 2 seconds and the detector transmits NORM message to the S2000-KDL controller
- Place the detector within 6 m from a glass surface so that its microphone faces the surface. Carefully strike the glass by means of Ø21 mm steel ball fixed at a string of approximately 0.35 m in length and deflected up to 30-60° angles. The strict value of deflecting angle can be taken from the Table 3. Don't stand between the detector and the glass surface while striking!
- Make sure LED indicating by triply sets of double flashes every 2 s, the first double flash having occurred 1 s after strike. INTRUSION ALARM message shall be displayed by net controller
- Power off the detector, remove front cover, and place the detector in Operating Mode by setting DIP switch #3 to OFF position
- Replace the cover, power up the detector, and make sure the NORM message is transmitted to the S2000-KDL controller
- Open the detector front cover and make sure the TAMPER ALARM message is transmitted to the S2000-KDL controller

## CHOOSING S2000-ST MOUNTING LOCATION

The S2000-ST glassbreak detector can be mounted on walls, or on ceiling, or between the protected glass and a window covering (blinds, curtains and so on).

In order to choose the proper mounting location, take into account the requirements as follows:

- Locate the S2000-ST detector within 6 m from the glass to be protected (see Figures 2-7)
- The mounting height is at least 2 meters from the floor (see Figures 2-7)
- Attach the detector within direct visibility and a clear view of all the protected glass given that microphone viewing angle is approximately 120°
- If ceiling mounted, the detector microphone should face the glass being protected at the best line of sight
- Being co-operated with a dynamic supersonic detector, S2000-ST must be placed no nearer than 1 meter from it.
- The sound noise level in the protected premises should not exceed 65 dB, that approximately corresponds to noise made by talking between two persons
- Avoid mounting the detector on the same wall as the protected glass or on the wall near the door
- Do always close all doors and windows within armed zone and shut off all equipment being able to generate acoustic noise signals

## SAMPLE S2000-ST INSTALLATION

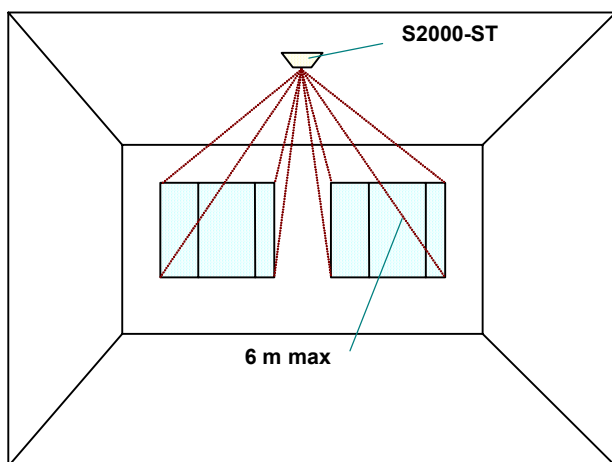


Figure 2: Ceiling Mounting

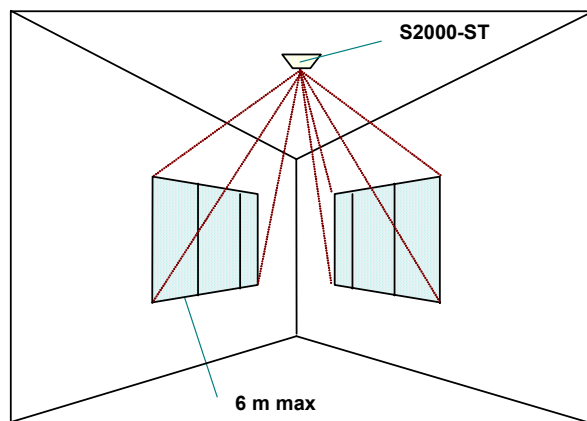


Figure 3: Ceiling Mounting

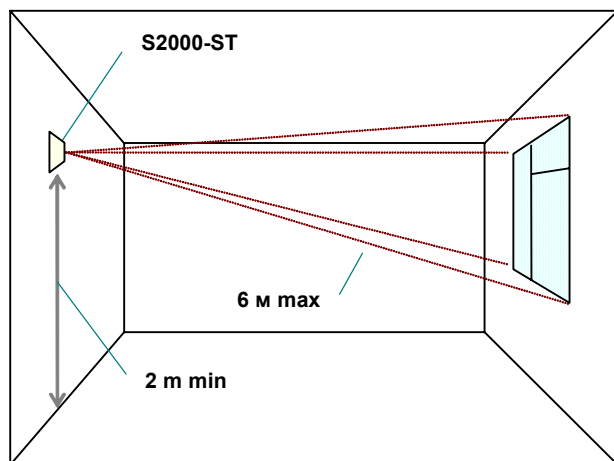


Figure 4: Opposite Wall Mounting

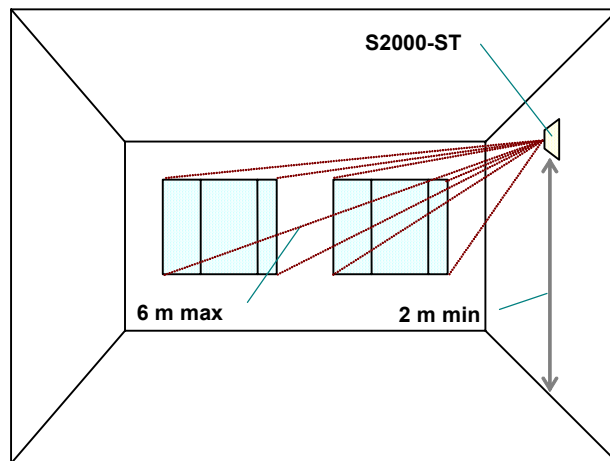


Figure 5: Adjacent Wall Mounting

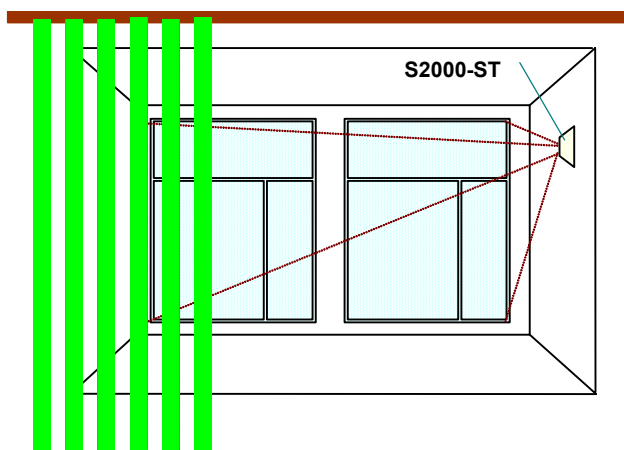


Figure 6: Mounting Behind a Window Covering

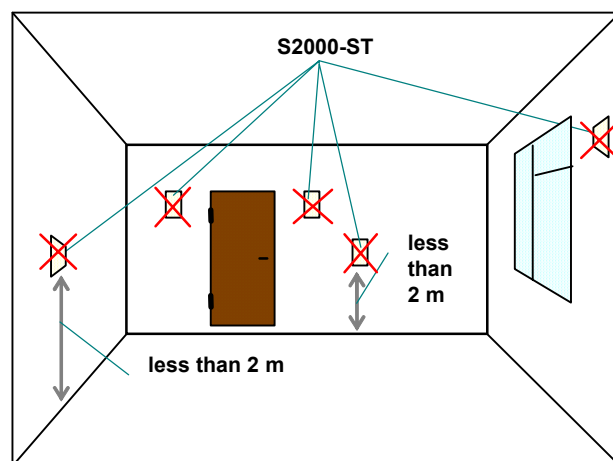


Figure 7: Inadvisable Mounting Location

## SENSITIVITY ADJUSTMENT

- Set the switch #3 to ON position. Make sure the LED is flashing singly to indicate the detector having placed in Test Mode
- Set both switches #1 and #2 to ON position, that is equivalent to minimal sensitivity
- Carefully strike the protected glass near the farthest point by means of Ø21 mm steel ball fixed at a string of approximately 0.35 m in length and deflected up to 30-60° angles. The strict value of deflecting angle can be determined depending on the glass thickness by referring to the Table 3.
- If the test blows are not followed by LED triply sets of double flashing, testifying signal having been not sensed by the detector, increase the detector sensitivity by means of switches #1 and #2 in accordance with Table 1 and repeat the procedure described until corresponding LED flashing appears.
- Screen the S2000-ST by its front cover and make sure the detector continues proper operating
- Finally, set the switch #3 to OFF position to place the detector in Operating Mode. Then close the cover, arm the detector and make sure the arming has been successful

**Table 3: Test Ball Angle Deflections in Degrees**

| The Glass Thickness in mm | <b>2,5-3</b> | <b>3,5-4</b> | <b>4,5-5</b> | <b>5,5-6</b> | <b>6,5-7</b> | <b>7,5-8</b> |
|---------------------------|--------------|--------------|--------------|--------------|--------------|--------------|
| Common Window Glass       | 30           | 35           | 40           | 45           | 50           | 55           |
| Filmed Glass              | 45           | 50           | 55           | 60           | 65           | 70           |

## TROUBLESHOOTING

Use Table 4 to solve minor S2000-ST operation problem. Consult BOLID Technical Support for assistance with problems that cannot be resolved using this document.

**Table 4: Troubleshooting**

| <b>Detector Behavior</b>                                                                                       | <b>Possible Cause</b>                                                                                                                                                            | <b>Procedure</b>                                                     |
|----------------------------------------------------------------------------------------------------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|----------------------------------------------------------------------|
| The operating detector fails being armed                                                                       | S2000-KDL controller is out of service<br>The electrical detector circuit is short or open failed<br>The detector PCB wire contacts are impaired<br>The detector cover is opened | Inspect all pointed possible causes and eliminated them if necessary |
| The operating detector doesn't generate alarms while affected by acoustic signals resulted from glass striking | The detector is not learned                                                                                                                                                      | Adjust the detector sensitivity as described above                   |

## MAINTENANCE THE DETECTOR

S2000-ST detector should be inspected at least once every month.

Do shut off detector power supply before any manipulation with it.

First, make the detector visual inspection to discover mechanical injures and to clean any dirt or dust if present. Then, make sure the detector is attached firmly and all electrical wiring contacts are tightened up. Finally, inspect the detector operability in accordance with testing procedure mentioned above.

When two or more false alarm have been occurred within a month, check integrity and properly tightening of detector connecting wires followed by above-noted functionality testing.

## WARRANTY

Manufacturer warrants S2000-ST Addressable Glassbreak Detector to operate in conformance with specification under normal transportation, storage, mounting, and maintenance.

Manufacturer warrants its product to be free from defects for 18 months since putting the S2000-ST into operation, but no more than 24 months since shipment, under normal use and service.

In the event of malfunction having occurred within warranty period the failed S2000-ST detector should be brought back to the manufacturer for replacement by known good unit. Supply the defected detector with a **damage certificate describing the defect and its acceptance certificate to validate the warranty status**. Send your complaints to the manufacturer at the following address:

ZAO NVP BOLID

#4, Pionerskaya street, Korolyov, Moscow Region, Russia, 141070

Tel./fax +7 495 777-40-20, +7 495 516-93-72.

E-mail: [info@bolid.ru](mailto:info@bolid.ru), Web-site: <http://www.bolid.ru>

## ACCEPTANCE CERTIFICATE

S2000-ST Addressable Glassbreak Detector

Product Designation

Serial Number

Produced, tested by quality control department in compliance with state standards and specifications, packed by NVP BOLID Company and qualified as deliverable.

Q.C.  
STAMP

\_\_\_\_\_  
Name

\_\_\_\_\_  
Date