

SEAM DETECTOR UNIT

TYPE **SDU6000**

P.S. **12-36VDC/0.5W**

CE

1 2 3 4 5 6 7 8 9 10 11 12 10 11 12 13 14

3-COLOR LED

SENSITIVITY

PC CONNECTOR

LOGIC OUTPUT (8.5A MAX)

CONTACT RATING

N.O.	COM	N.C.
MAX 1A INDUCTIVE RES.		
MAX 10A RESISTIVE		
MAX POWER 30W		

DISABLE IN/OUT

TO FROM

OPTO ISOLATED 0 - 40 VDC

ENABLE INPUT

POWER SOURCE

12 - 36 VDC

SDS6000

GELEC

GELEC INDUSTRIAL ELECTRONICS
ATHENS - GREECE
www.gelec.gr

INDUSTRIAL ELECTRONICS

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I. PRECAUTIONS!

There are no serviceable parts inside the **SDU6000** unit. Not to be opened by any unauthorized person. All repairs to the device must be carried out by the manufacturer, or a qualified service engineer.

Improper handling may result in serious personal injury and considerable material damage. All connection and maintenance work must be carried out by qualified personnel.



RISK OF ELECTRIC SHOCK!

Use the correct voltage. The SDU6000 is designed for use with specific voltage only. Connection to a different voltage may cause fire, electric shock or other damage.

Do not touch the plug and the connectors with wet hands.

Disconnect the SDU6000 before cleaning it, to avoid the risk of electric shock.

Attempting to use a malfunctioning SDU6000 can be dangerous.

Do not block the ventilation slots on the cabinet of the SDU6000.

Keep liquids away from the SDU6000.

Spillage into the cabinet may result to fire, electric shock, or equipment damage. If a small object or liquid falls/spills into the SDU6000 cabinet, unplug the unit immediately. Have the unit checked by a qualified service engineer before using it again.

Set the SDU6000 in an appropriate location.

Do not install in a dusty, humid, or vibrating environment. Do not place it near heater, or air conditioner. Keep it away from air, steam, extremely high or low temperature or humidity.

Always follow the instructions given by the manufacturer and use the SDU6000 in accordance to its specifications.

2. MANUFACTURER'S WARRANTY, GENERAL TERMS AND CONDITIONS

Thank you for purchasing our product.

Our products have been manufactured with the latest technology, the highest quality components and have gone through rigorous quality control tests at the factory, before shipment. Make sure that the part number and type indicated in the identification label and pack correspond to the part number or type of your order. After receiving, inspect the unit to ensure that no damage have been caused during transportation.

GELEC and GELEC's authorized distributors warrant to the original purchaser that the product shall be free from defect in material and/or workmanship. The warranty period begins on the purchase date (proof of purchase by invoice or delivery note) and is valid for one (1) year.

In the event of malfunction during the warranty period attributable directly to faulty material and/or faulty construction and functional defects, GELEC and authorized distributors will, at their option, either repair or replace the faulty product with the same or similar model.

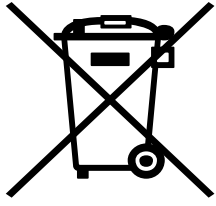
GELEC and authorized distributors shall have no obligation under this warranty, however, in the following cases:

- Any defect caused by freight damage, accident, disaster, faulty maintenance or improper handling.
- Any defect caused by modification, alteration, abuse, misuse or incorrect installation.
- Any defect of the product caused by improper repair by third party other than GELEC and GELEC's authorized distributors.
- Any incompatibility of the products with subsequent technical innovations or regulations.
- Any defect of the product caused by external equipment.
- Any defect of the product on which the original manufacturer's labeling has been altered or removed.

In case of complaint please contact our company or send the unit un-dismantled to your local dealer. Any necessary replacement parts and necessary repair work are totally covered free of charge.

All products are designed and produced by the manufacturer GELEC Co. LP to be in compliance with the EU norms applying to them. GELEC is not responsible for direct or indirect damages or malfunction caused by improper use or installation of the SDU6000.

3. DISPOSAL OF OLD ELECTRICAL & ELECTRONIC EQUIPMENT



This symbol, found on your product, indicates that this should not be treated as household waste when you wish to dispose it.

It should be handed over to an applicable collection point for the recycling of electrical and electronic equipment.



By ensuring this product is disposed of correctly, you will prevent potential negative consequences to the environment and human health, which could otherwise be caused by inappropriate disposal of this product.

The recycling of materials will help to preserve natural resources.

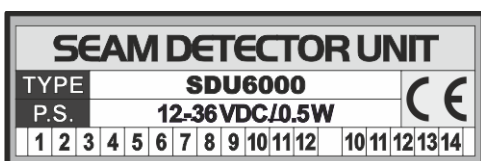
4. SEAM DETECTOR UNIT SDU6000

This operator's manual explains the functions and operation of the SDU6000. It also gives some troubleshooting tips as well as general precautions to be taken when operating the unit. In order to ensure the best performance and effective use of the SDU6000, we recommend that you read the information in this manual carefully and follow the instructions contained.

This manual is a complete guide to the SDU6000 with information on unit user maintenance, unit installation and instructions on how to operate it. Do not touch any part of the SDU6000 the manual does not cover. Keep the manual for immediate reference. It should help in solving any operational questions you may have.

No part of this manual may be quoted, reproduced, stored in a retrieval system, transmitted, transcribed or translated into any other language in any form or by any means, electronic, mechanical, or otherwise, without prior written permission of "Gelec Co. LP".

Although every effort has been made to ensure that this manual provides up to date information, please note that the contents in this manual and the unit specifications are subject to change without notice.



Do not forget to refer the exact type and version of your SDU6000 whenever you contact the manufacturer, asking for any further information. You can find this information on the identification label on the side of the unit.

5. GENERAL DESCRIPTION

Seam Detector Unit SDU6000 is an electronic device, which detects fabric seam passages in fabric dyeing machines. Its sensor, mounted externally near the machine chamber opening, is triggered by the passage of a magnet which is sewn into the fabric rope, close to the seam. When a seam passage is detected, the device's relay output is activated for further utilization and optical indication is also provided by the on-board LED.

SDU6000 is designed and manufactured to automatize the difficult and time-consuming task of manual seam searches on fabric ropes. The SDU6000 executes this procedure automatically, informs the main controller about the seam passage for any selected procedure, or/and stops the machine, placing the seam close to the chamber opening.

The use of SDU6000 decreases unloading/sampling time and therefore increases productivity. Dyeing process supervision and control are also improved by utilizing the provided signals and features for passage based procedures. Fabric damage due to sampling is also minimized, as the samples can be collected from the same point of the fabric rope.

It can be fitted to any type of fabric dyeing machine (Atmospheric, High Temperature etc.). A sensor has to be mounted near every chamber opening, close to the fabric path. The optional front panel indication device *SD Monitor SDM6000* provides the necessary information about seam passages and when the machine stops, it indicates the corresponding channel number where the seam is detected. A series of compatible sensors, accessories and features are available for fully customized applications.

SDU6000 has a PC input for communicating with the *Seam Detector Service Tool*, a diagnostic PC software, which provides real time visualization of the sensor signals, electrical noises etc. It also allows the engineer to make adjustments in several device parameters. This analysis and monitoring gives a complete overview of the application environment and maximizes the SDU6000 functionality, solving detection problems in very demanding applications.

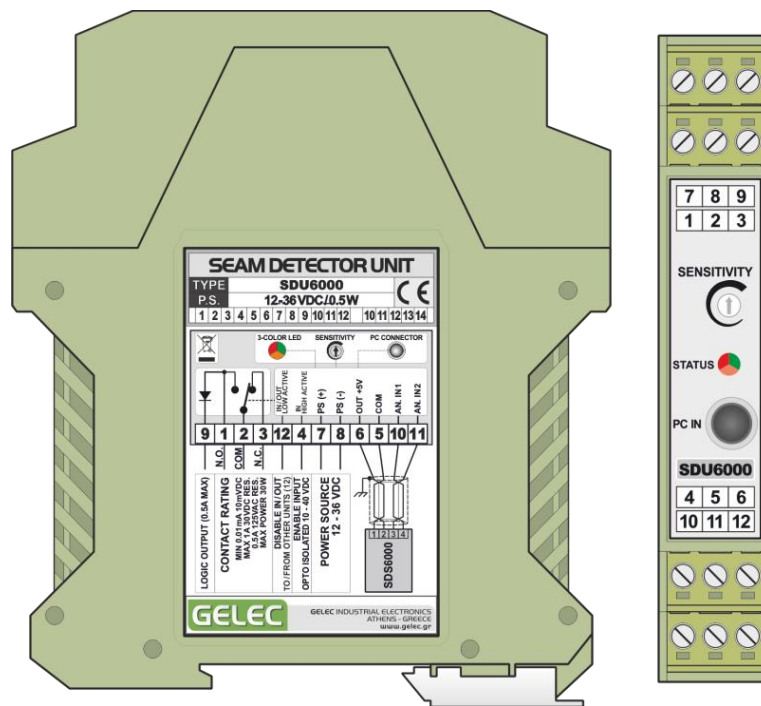


fig. 1

FEATURES

- ▶ Detection in wide range of fabric speed (up to 500m/min)
- ▶ Separate unit far from the sensor harsh environment
- ▶ Easy sensor replacement without modifying the machine wiring
- ▶ Diagnostic PC software *Seam Detector Service Tool* (3,5mm Jack to USB)
- ▶ Reliable detection up to 135°C
- ▶ *DETECT SMART ALGORITHM* for distinguishing a magnet passage from random noises.
- ▶ *AUTO GAIN* depending on the signal volume - 8 Gain Levels
- ▶ *DYNAMICALLY ADAPTING COMPARATOR THRESHOLDS*
- ▶ *SLEEPING MODE*
- ▶ Two opto-isolated inputs (*ENABLE* & *DISABLE*) for avoiding false detections during standard machine operations without PLC software.
- ▶ Voltage free relay output, plus one *LOGIC OUTPUT* through a diode
- ▶ Detection distance up to 30cm
- ▶ Onboard trimmer for additional sensitivity adjustment
- ▶ Tri-color indication LED
- ▶ Wide power supply range 12-36VDC
- ▶ For mounting on DIN rail NS35 (acc. to EN60715)
- ▶ Accessories

6. MAIN FUNCTIONS

► OPERATION

Seam Detector Unit SDU6000 achieves seam detection by monitoring the magnetic field alternations around its sensor area. The SD Sensor is triggered by a PTFE encapsulated magnet attached near the seam at fabric loading. The SD Unit analyzes the connected sensor's readings and when its software confirms a true magnet passage, it provides an output signal.

SEAM DETECTION FOR SAMPLING - UNLOADING:

The dyeing machine enters a stop mode on demand, either manually from operator's control panel, or automatically from the dyeing program. When the next seam is detected, the main reel stops with the seam located in front of the chamber opening, either for sampling, or unloading.

With the proper software you can either stop a selected seam, or the first-to come seam, or within the current fabric revolution all the seams successively for total unloading. This procedure will last one cycle time at maximum, because the total volume of the fabric after entering the stop mode will revolve at most for one whole cycle.

SEAM DETECTION FOR SEAM PASSAGE MONITORING:

Information can be gathered for calculating the real fabric speed and cycle time, avoiding possible problems in dyeing procedure. By creating proper software at the machine main controller, you can achieve further fabric management, such as full information for any channel (total revolution time, total number of seam passages etc.).

► RELIABLE DETECTION - VALID MAGNET PASSAGE

In seam detection applications under certain circumstances, the machine equipment, the application geometry and the industrial environment in general, could affect the magnetic field around the sensors and trigger them without having a magnet passage.

The SDU6000 hardware and software are designed to examine a variety of preconditions which have to be satisfied, in order to consider a sensor signal as a valid magnet passage and permit an output signal.

Eight gain levels automatically adjusted according to the signal volume, keep the detection performance constantly in the maximum level.

Dynamically Adapting Comparator Thresholds maintain the device's detection response high during fabric revolution, even in environments with high level of noise.

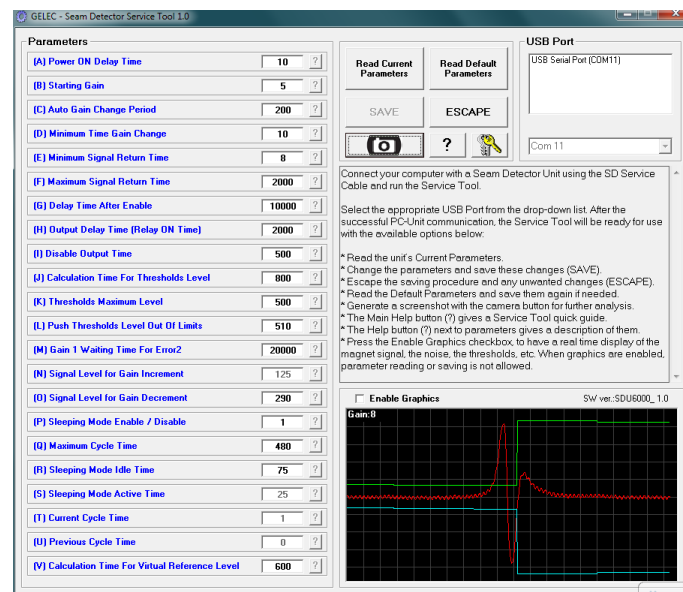
Onboard sensitivity trimmer for manual adjustments.

Detect Smart Algorithm which filters out any possible sensor signal which is not a magnet passage. An actual magnet passage has a specific affection on the area's magnetic field. This algorithm analyzes the signal's behavior and confirms a true passage.

Sleeping Mode operation, useful for applications with periodic magnet passages. When this operation is selected, the unit output is idle for a desirable period within the current fabric cycle, where a magnet passage is unexpected. Check the *Sleeping Mode* section and the unit's *State Table* for details.

► SEAM DETECTOR SERVICE TOOL

The Seam Detector Service Tool is a diagnostic PC software, which allows the configuration and monitoring of the Seam Detector Unit SDU6000. It is a service tool for OEM and authorized service engineers, which provides access to the unit's operational parameters and real time graphics of the sensor readings.



At the front of the SDU6000 there is a 3,5mm Jack input for the communication with the Seam Detector Service Tool through the SD Service Cable.



SD Service Cable

PARAMETER MODIFICATION

The default operating parameters of the SD Unit are pre-installed by Gelec and their values have been selected after rigorous tests in laboratory and field applications. However on occasion, modifications may be necessary depending on each application.

Reading the current parameter values, modifying them, or restoring the default ones, are some of the tools provided. Short descriptions and recommended value ranges are also available. These changes should be done only under Gelec guidance, or by an engineer who is familiar with the SD Unit operation and features. A wrong set of selections may lead the system in faulty operation.

REAL TIME GRAPHICS

When you enable graphics, the sensor readings will start 'running' as a waveform in SD Service Tool. After observing this waveform for some fabric revolutions and magnet passages in different machine speeds, you will have a complete picture about the seam detection process.

The waveform represents the reading of the magnetic field at the SD Sensor installation area. Each time a magnet passes through the sensor detection area, a sinusoidal pulse is generated in the graphics frame. Screenshot export for further analysis is also available.

The visualization of the sensor readings is an important advantage for accomplishing optimum seam detection during machine operation. The installer/engineer can easily monitor and track any factor (eg a motor near the sensor, a random cause at the customer facilities etc.) that interferes in sensor readings and affects the proper seam detection process.

The SD Sensor's advanced detecting ability and the SD Unit's *Detect Smart Algorithm* will lead the system to adapt in the environment conditions and distinguish true magnet passages from random noise. However, the installer should exploit the provided information and minimize the noise near the sensor, or select a better mounting position for it, in order to maintain the detection efficiency in the highest possible level.

► RELAY OUTPUT & LOGIC OUTPUT

RELAY OUTPUT

The SD Unit relay output is activated for a short period of time after a valid magnet passage (terminals #1, #2, #3). The *Output Delay Time (ODt)*, is programmable through the SD Service Tool, having a default value of 2 seconds.

LOGIC OUTPUT

The logic output is a clone of the relay output, available at terminal #9. It is used in applications where multiple SDU6000 are installed and a common signal of all is needed (see application diagrams). The Normally Open contact of the relay is internally connected with terminal #9 through a diode. Therefore, each output signal at terminal #1, is also an output signal at terminal #9.

This output can only be used when positive potential is applied to the output relay, so different configuration will not function. If negative potential is required, contact us for details.

► **DISABLE INPUT/OUTPUT**

Depending on application's geometry and equipment, a motor stop after magnet passage detection, can produce high magnetic noise, which can trigger by mistake the SD Sensors of neighbor chambers and generate faulty output signals.

Using the DISABLE feature in applications with more than one SD Units, when an SD Unit detects a passage, it forbids the output signals of the rest of the SD Units. This way, a possible noise caused by the motor stop is not able to cause faulty signals to neighbor chambers. The actual period which the rest of the SD Units stay disabled is 2-5sec and it is programmable through the SD Service Tool.

Notice that these 'blind periods' protect the other SD Units from faulty detections, but the side effect is that they also lose possible magnet passages within this period. This may influence seam passage monitoring, so you should examine if the use of the *DISABLE* feature is actually necessary in your application.

DISABLE feature can be useful in machines which support separate chamber stop and don't have proper PLC software for managing similar problems. On the contrary, there is no meaning of using it in machines with inseparate chamber control, in machines which solve the problem with proper PLC software, or of course in machines with a single chamber.

Terminals #12 should be parallel-connected in order to utilize the DISABLE feature. This terminal works on occasion either as output, or as input (opto-isolated). Each time an SD Unit detects a magnet passage it uses terminal #12 as an output, setting it to LOW dynamic. The rest parallel connected SD Units use their terminals #12 as inputs and forbid their output signals for a short period.

If the DISABLE feature is not necessary, just leave terminals #12 unconnected.

► **ENABLE INPUT**

The SDU6000 has a remotely activated ENABLE input (opto-isolated). This is an additional feature for output management, helping to ignore misleading output signals during machine normal operation. When this input is activated, the SD Unit generates normally its output signals during seam detection. When this input is de-activated, output signals are not permitted, even if a magnet passage has been confirmed.

For example, during REVERSE DRIVE of the fabric reel, the magnet can trigger the SD Sensor, though this detection shouldn't generate an output signal. With proper connections and without additional PLC software, the ENABLE input can be deactivated during REVERSE DRIVE, having as a result the block of a possible output signal.

After ENABLE input activation, there is an *Enable Delay Time* (EDt) until the input is considered actually activated and output signals are permitted. This delay time is programmable through the SD Service Tool (**10sec** default). This delay is useful at motor starts.

In a common layout, the FORWARD DRIVE command also causes the activation of the ENABLE input, for having normal Seam Detection and output signals during machine operation. Though, when the motor starts, the area's magnetic field is affected due to rapid acceleration, which is something that could trigger the SD Sensor. This short delay provides the necessary time window, blocking any possible faulty output signal.

The ENABLE input is a useful feature and can be used in many ways, according to each application's needs.

► **SLEEPING MODE**

Sleeping Mode is an ON/OFF (1-0) operation, for dyeing applications with a fixed magnet passage frequency, for large periods of time. When *Sleeping Mode* is active, a procedure is carried out which makes the SD Unit's output idle for a period in the Current Cycle Time (CCT), considering the Previous Cycle Time (PCT).

During machine operation, the unit counts the time between the last two magnet passages (PCT). Considering this time, the unit's output turns inactive for a period where the following magnet passage is unexpected (IDLE TIME). This way, potential faulty output signals (e.g. caused by random noise) are avoided. The completion of IDLE TIME is followed by the period where a magnet passage is again expected (*ACTIVE TIME*). The unit's output is again able to give an output signal when the magnet passes.

By default, *IDLE TIME* is 75% of *PCT*, followed by the *ACTIVE TIME*, which is 25% of *PCT*. Refer to the *STATE TABLE* for more information. You can change these percentages, or even deactivate Sleeping Mode through the SD Service Tool.

The procedure starts at the second passage, with the *Enable* input activated. Independently of the Sleeping Mode phase, the unit constantly detects and will not lose or avoid a passage. When necessary, the unit software resets and initializes this operation.

► **SENSITIVITY TRIMMER**

If needed, the onboard trimmer provides an additional hardware sensitivity adjustment. Turn clockwise to increase sensitivity and counter-clockwise to decrease sensitivity.

► **STATUS LED**

At the front of the SD Unit there is a tri-color indication LED (red-green-orange) which informs the user about the SD Unit's status during operation. Please refer to the *STATE TABLE* in this manual for further information.

► **PC INPUT**

At the front of the SD Unit there is a 3,5mm Jack input for PC connection through the SD Service Cable. The installation of the Seam Detector Service Tool is necessary.

► **ERRORS**

The SD Unit is designed to diagnose and manage two possible error states and indicate them accordingly through the *STATUS LED*.

ERROR 1 (FLASHING RED, 50% ON - 50% OFF)

This error is related with the unit's *DISABLE* input/output. When more than one SD Units are installed, terminals #12 can be parallel-connected (check *DISABLE INPUT/OUTPUT* section).

If the SD Unit has a constant signal in its *DISABLE* input, this means that one of the other SD Units sends this signal constantly (not for a short period as it should), therefore there is a hardware problem in one *DISABLE* I/O of the group.

Notice that during this error state, the *DISABLE* feature is cancelled in all SD Units. Since all of them are connected to each other, they are all indicating this error at the same time through their *STATUS LED*. Despite the error state, the seam detection continues normally.

You can find the malfunctioning unit, by following the procedure below.

- Disconnect the first SD Unit's bottom connector block (#10, #11, #12) which includes the DISABLE input, without disconnecting the installation wiring. If this is the unit that causes the problem, you should see the other SD Units exiting their error state.
- If the other units are still blinking, connect the first unit's connector block back and do the same at the second unit, the third unit etc., until you find the faulty unit.

If the DISABLE feature is necessary for your application, you can temporarily bypass the faulty unit's terminal #12 (so it does not transfer the error problem to the other units), until you replace it with a new one.

ERROR 2 (FLASHING RED, 90% ON - 10% OFF)

This error occurs when the noise at the SD Sensor's installation area is very high for over a certain period of time. In such high level of noise, the unit cannot properly evaluate the sensor readings and detect a valid magnet passage. For as long as the problem exists, the STATUS LED will flash and the unit will be idle, deactivating its output. You should track the noise source and take actions accordingly.

STATE TABLE OF SEAM DETECTOR UNIT SDU6000								
INPUTS				OUTPUTS			SLEEPING MODE ⁽²⁾	
Power	Enable input ⁽¹⁾	Disable input	Analog input ⁽¹⁾ (Valid Magnet Passage)	Relay	Status LED ⁽¹⁾	Disable output	IDLE TIME ⁽²⁾	ACTIVE TIME
OFF	INDIFFERENT	INDIFFERENT	INDIFFERENT	OFF	OFF	OFF		
ON	OFF	INDIFFERENT	INDIFFERENT	OFF	RED	OFF		
ON	OFF	OFF	PASSAGE	OFF	OFF (INSTANTLY FOR EACH PASSAGE)	OFF		
ON	ON before EDt	OFF	INDIFFERENT	OFF	FLASHING ORANGE (50% ON / 50% OFF)	OFF		
ON	ON after EDt	OFF	WAITING PASSAGE	OFF	FLASHING GREEN (50% ON / 50% OFF)	OFF		
ON	ON	OFF	1st PASSAGE AFTER POWER ON	ON 2sec ⁽²⁾	ORANGE (AS LONG RELAY IS ON)	ON ⁽²⁾	START OF 1st CYCLE TIME	
				OFF	GREEN			
ON	ON	OFF	2nd PASSAGE	ON 2sec ⁽²⁾	ORANGE (AS LONG RELAY IS ON)	ON ⁽²⁾	END OF 1st CYCLE TIME & START OF SLEEPING MODE	
				OFF	FLASHING GREEN DURING IDLE TIME (25% ON / 75% OFF)		IDLE TIME (75% of Prev Cycle Time)	ACTIVE TIME (25% of Prev Cycle Time)
					GREEN DURING ACTIVE TIME			
ON	ON	OFF	NEXT PASSAGES	AS IN PREVIOUS PASSAGE			AS IN PREVIOUS PASSAGE	
ON	ON	ON	INDIFFERENT	OFF	OFF			
ERROR 1				(3)	FLASHING RED (50% ON / 50% OFF)	ON	SLEEPING MODE RESET	
ERROR 2				OFF	FLASHING RED (90% ON / 10% OFF)	OFF	SLEEPING MODE RESET	

(1) After selected Power Delay time

(2) Programmable parameter

(3) Normal operation according to Valid Magnet Passage

7. SD SENSORS

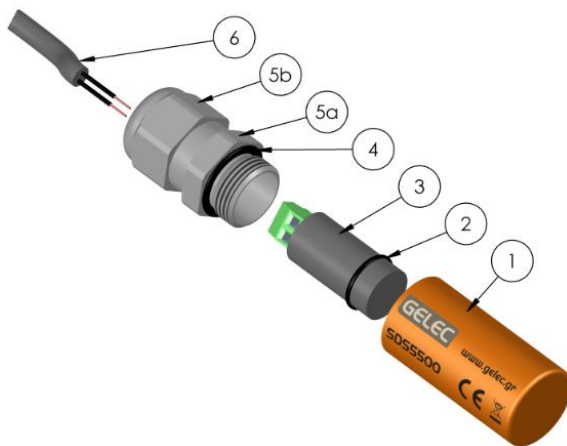
SEAM DETECTOR SENSOR SDS5500



The Seam Detector Sensor SDS5500 is a part of the Seam Detection System, which is commonly used in fabric dyeing machines, using inductor technology. It is compatible with the Seam Detector Units GCSDU5000 and SDU6000. It should be mounted externally on the machine close to the fabric path (up

to 25cm), which has a magnet (MSD05 - Ø8x40mm) sewed on its seam.

OVERVIEW OF THE SENSOR



Exploded view

- (1) Sensor casing
- (2) Shock absorbing o-ring
- (3) Sensor and terminal block encapsulated in casting system (epoxy resin)
- (4) Sealing o-ring
- (5) Cable gland (M16x1,5) for the cable insertion, connection and sealing
- (6) Connection cable (not included)

VERSIONS

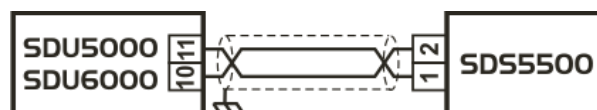
The sensor comes in two versions, **SDS5500** and High Temperature version **SDS5500-HT**. For the sensor's replacement, only the sensor spare part **SDS5500-SP** is needed (item 3 in Exploded view).

INSTALLATION / REPLACEMENT PROCEDURE

1. Prepare the cable to suit the equipment geometry (*pic1*) and connect properly to the SD unit (terminals 10/11 on the unit, specific polarity not important) (*pic2*). Notice that the shield should only be grounded at the cable end where the SD Unit is installed. At the sensor side, just cut the shield so it is covered from the outer jacket and don't connect. A connection diagram is also printed on the sensor casing.

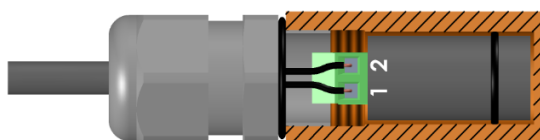


pic 1



pic 2

2. Dismantle the device (*Exploded view*). Unscrew the gland body (5a) from the casing (1) and remove the sensor (3).
3. Insert the cable in the cable gland and connect the wires at the sensor terminal block.
4. With the sealing nut (5b) relaxed, put the sensor back in the casing and tighten the gland body (5a) into the casing with a spanner (19mm size) until heavy resistance is achieved. The sealing (4) and the shock absorbing (2) o-rings should be in their position.
5. Hold the sensor in its final position by pushing the cable (6) against the casing, and tighten the seal nut (5b) with a spanner until it has clearly engaged the cable and cannot be further tightened.



Final assembly

In case a sensor replacement is needed, just exchange the old sensor (3) with the new spare part and follow the same procedure. The rest of the existing equipment (installation cabling, cable gland, casing, etc.) will remain as it was.

REPLACING OLDER SENSOR VERSIONS

The SDS5500 is compatible with the GCS DU5000 Seam Detector Unit. It is proper for replacing any sensor which works with these units. Follow the procedure below.

1. Cut the existing cable close to the old sensor, in order to have adequate length for the new sensor installation.
2. Follow the installation procedure as described above.
3. Using the onboard trimmer of the GCS DU5000 unit, increase the sensitivity to maximum. In case this maximum level causes undesirable detections due to other interferences, observe the operation and start reducing the sensitivity, until you have only the true magnet passages detected.

SDS5500 TECHNICAL DATA		
	SDS5500	SD5500-HT
Operating temperature	-20°C ... +100°C	-15°C ... +135°C
Dimensions (assembled)	Ø20mm x 64mm	Ø20mm x 61mm
Weight	24 gr	43 gr
Connection Cable	2 x 0,34...1 mm ² Cable outer Ø 4,5...10mm (shield)	2 x 0,34...1 mm ² Cable outer Ø 4,8...5,8mm Cable outer Ø 8,5...10,8mm (shield) ⁽¹⁾
Materials (Casing/Cable gland)	Ertalon 4.6 / Polyamide, CR	Ertalon 4.6 / Nickel-plated brass, FKM
Resistance	approx. 800 Ohms (at 25°C)	
Degree of protection	IP67 when correctly mounted	

⁽¹⁾ If the use of shielded cable is necessary at the HT version, a thread enlarger combined with a bigger cable gland is necessary, due to the shielded cable's bigger outer diameter. Please contact us for details.

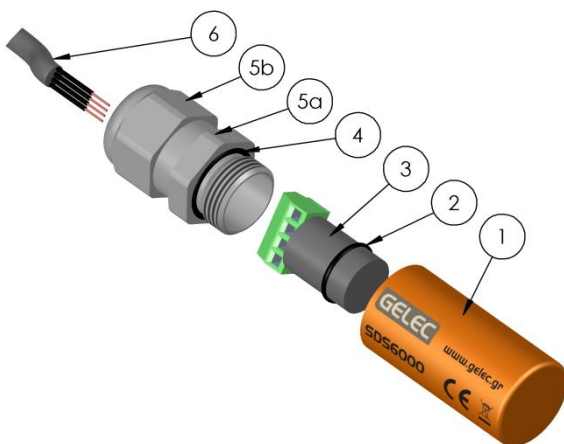
SEAM DETECTOR SENSOR SDS6000



The Seam Detector Sensor SDS6000 is a part of the Seam Detection System, which is commonly used in fabric dyeing machines. Having an innovative and latest technology magnetic sensor, it maximizes the detection efficiency. It is compatible with the Seam Detector Unit SDU6000. It should be mounted

externally on the machine close to the fabric path (up to 30cm), which has a magnet (MSD05 - Ø8x40mm) sewed on its seam.

OVERVIEW OF THE SENSOR



Exploded view

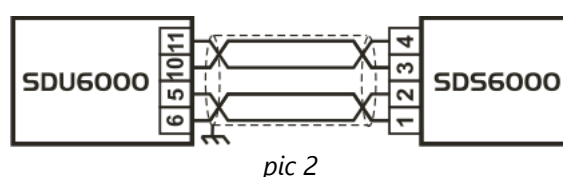
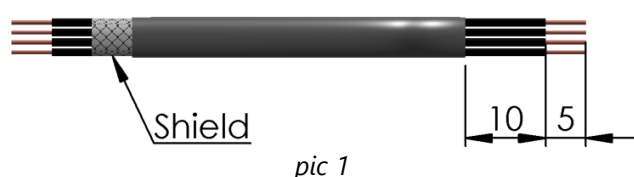
- (1)** Sensor casing
- (2)** Shock absorbing o-ring
- (3)** Sensor and terminal block encapsulated in casting system (epoxy resin)
- (4)** Sealing o-ring
- (5)** Cable gland (M16x1,5) for the cable insertion, connection and sealing
- (6)** Connection cable (not included)

VERSIONS

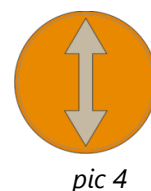
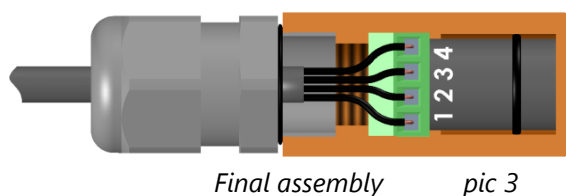
The sensor comes in two versions, **SDS6000** and High Temperature version **SDS6000-HT**. For the sensor's replacement, only the sensor spare part **SDS6000-SP** is needed (*item 3 in Exploded view*).

INSTALLATION / REPLACEMENT PROCEDURE

1. Prepare the cable to suit the equipment geometry (*pic1*) and connect properly to the SD unit (terminals 5,6,10,11 on the unit) (*pic2*). Notice that the shield should only be grounded at the cable end where the SD Unit is installed. At the sensor side, just cut the shield so it is covered from the outer jacket and don't connect. A connection diagram is also printed on the sensor casing.



2. Dismantle the device (*Exploded view*). Unscrew the gland body (5a) from the casing (1) and remove the sensor (3).
3. Insert the cable in the cable gland and connect the wires at the sensor terminal block.
4. With the sealing nut (5b) relaxed, put the sensor back in the casing and tighten the gland body (5a) into the casing with a spanner (19mm size) until heavy resistance is achieved. Notice that you should keep the casing steady (NOT the gland body) during tightening, to avoid internal cable torsion. The sealing (4) and the shock absorbing (2) o-rings should be in their position.
5. Hold the sensor in its final position by pushing the cable (6) against the casing, and tighten the seal nut (5b) with a spanner until it has clearly engaged the cable and cannot be further tightened.
6. At the bottom of the sensor there is a double-direction arrow (*pic4*). Install the sensor in a way that the fabric route in that point (and therefore the magnet route), is parallel to that arrow. This will maximize the sensor's detecting ability.



In case a sensor replacement is needed, just exchange the old sensor (3) with the new spare part and follow the same procedure. The rest of the existing equipment (installation cabling, cable gland, casing, etc.) will remain as it was.

SDS6000 TECHNICAL DATA

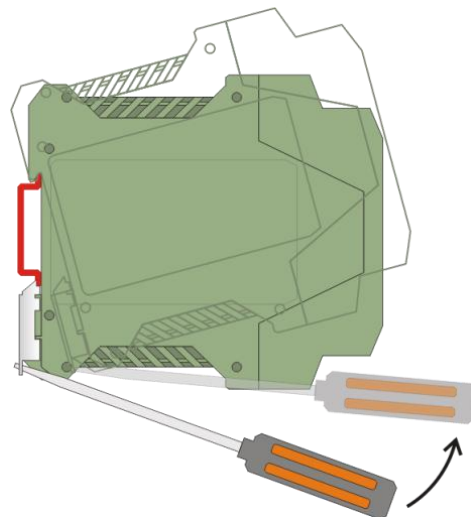
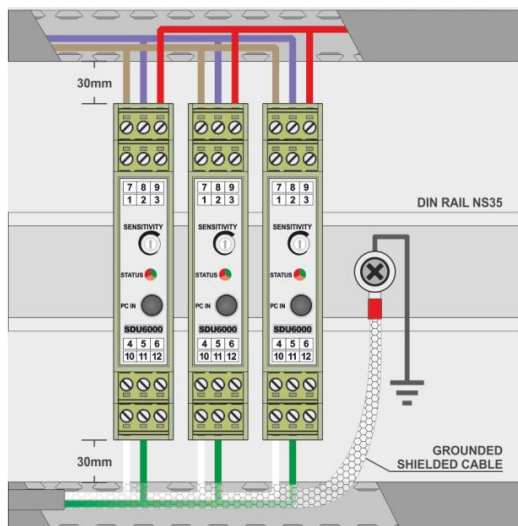
	SDS6000	SD6000-HT
Operating temperature	-20°C ... +100°C	-15°C ... +135°C
Dimensions (assembled)	Ø20mm x 64mm	Ø20mm x 61mm
Weight	19 gr	38 gr
Connection Cable	4 x 0,34...1 mm ² Cable outer Ø 4,5...10mm (shield)	4 x 0,34...1 mm ² Cable outer Ø 5,8...6,8mm Cable outer Ø 8,5...10,8mm (shield) ⁽¹⁾
Materials (Casing/Cable gland)	Ertalon 4.6 / Polyamide, CR	Ertalon 4.6 / Nickel-plated brass, FKM
Degree of protection	IP67 when correctly mounted	

⁽¹⁾ If the use of shielded cable is necessary at the HT version, a thread enlarger combined with a bigger cable gland is necessary, due to the shielded cable's bigger outer diameter. Please contact us for details.

8. INSTALLATION

SD UNIT INSTALLATION

The SDU6000 unit is composed of an electronic board in a thermoplastic enclosure (Polyamide PA 6.6), suitable and approved for electrical and electronic devices. It is designed to be installed inside an electrical control panel, placed on an Ω-type DIN rail NS35 (acc. to EN60715).



In the rearward there is a clip for fast and tool-free mounting on the DIN rail. Position the unit on the DIN rail, tilting the module to hook the DIN rail tabs over one edge of the DIN rail. Hang the top on the rail, and then press the bottom to force the locking clip to snap over the edge of the rail. To remove it from DIN rail, use a screwdriver to pry out the locking clip and lift the unit outward.

A 30mm extra space on top and below the unit is recommended for proper ventilation, connection wiring and connector extraction. Wrong wiring/connection configuration may cause fire, malfunction or permanent damage to the unit.

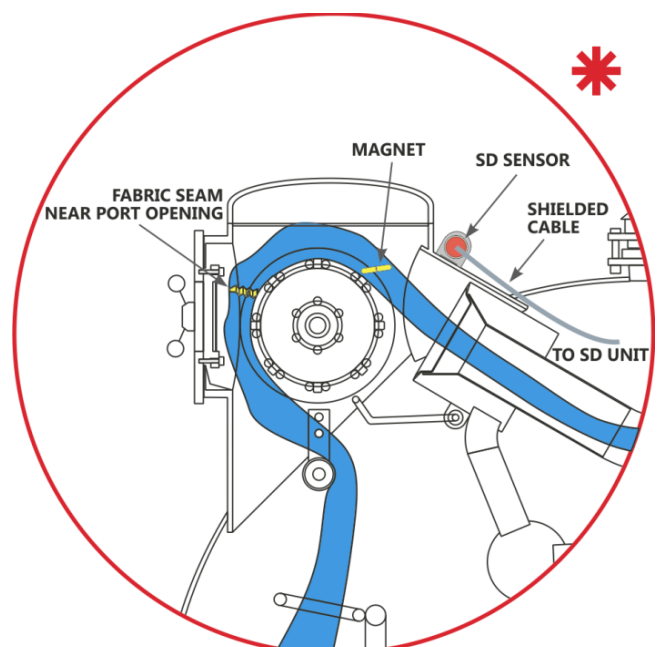
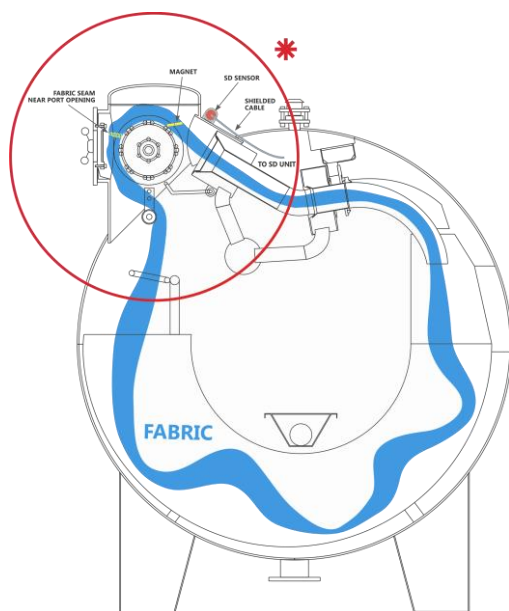
SD SENSOR INSTALLATION

Select a compatible SD Sensor according to your application needs and refer to its datasheet for technical specifications and installation instructions. Also refer to the following connection diagrams and application examples for more information.

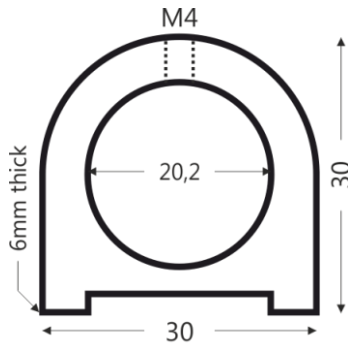
SENSOR POSITION

SD Sensors are designed to be mounted externally on the machine, in a position as close as possible to the fabric path. Internal mounting with proper protection from the machine environment is also an option.

If possible, select a position far from noise sources that would affect the magnetic field around the sensor during machine operation (transformers, inverters, motors). It is also important that you keep it as far away as possible from neighbor chambers, avoiding sensor triggering from another chamber's magnet.



If your application requires a bigger detection range than the SD Sensor's, contact us for discussing alternative installation configurations.

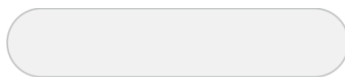


SD Mounting Bracket
SDB01

Make sure to firmly stabilize it in its final position, in order to prevent any displacement or vibration during machine operation. Use *Gelec SD Mounting Bracket SDB01* or a customized antimagnetic mounting component.

MAGNET

During fabric loading, attach the magnet on the fabric at such a position that when detected from the SD Sensor, the seam will be located at the port opening. Ensure that the magnet is protected during fabric revolution and will remain in its position.



SD Magnet MSD05
Ø 8 - L40mm

A common and tested type is a cylindrical PTFE coated Alnico V magnet (Ø8 - L40mm). Use *Gelec SD PTFE Encapsulated Magnet MSD05*, or any similar magnet that meets the environment/application requirements.

CONNECTION CABLE

The SD Sensor connection cable is an important part for proper Seam Detection. In case of potential electrical interferences, the use of shielded cable is recommended. Avoid wiring along power cables and protect it from sharp surfaces that may lead to its damage.

Choose carefully the cable type depending on your application and always keep it within the sensor specifications.

9. ELECTRICAL SECTION

SDU6000 has a wide power supply range. Supply with **12-36VDC**, either regulated or unregulated. Maximum power consumption is approximately 0.5W in total operation. There is not an electrical safety fuse in the internal power circuit.

Connection to a different voltage may cause fire, electric shock or other damage.

OPTO ISOLATED I/O

The SD Unit's *ENABLE Input* and *DISABLE Input/Output*, are opto-isolated. The input voltage may vary from 10VDC to 40VDC and the input current from 5mA to 20mA according to input voltage.

CONNECTION TERMINALS

The unit is equipped with four triple pluggable terminal connectors, arranged in two rows located atop and at bottom of the unit. Make sure to apply the recommended tightening torque. The wire range should be 28-12AWG (UL) or 0.25 mm² - 1.5mm² (IEC).

Terminals #1 - #2 - #3

Terminals for the SD Unit's relay output. Make sure not to exceed the relay contact rating.

Terminal #4

Terminal for the SD Unit's opto-isolated *ENABLE Input*. Input voltage may vary from 10-40VDC and the input current from 5-20mA according to V_{IN} .

Terminals #5 - #6 - #10 - #11

Use these terminals for the SD Sensor connection.

Terminals #7 - #8

Connect the power supply to terminals **#7 (+)** and **#8 (-)**.

Terminal #9

It is the *LOGIC Output*, internally connected with the N.O. contact of the output relay, available through a diode. Each output signal at terminal #1, is also a signal at terminal #9.

This output can only be used when positive potential is applied to the output relay, so different configuration will not function. If negative potential is required, contact us for details.

The diode specifications override the contact rating. Ensure that both currents (sum of current #1 and #9) are not exceeding maximum contact rating.

Terminal #12

Terminal for the SD Unit's opto-isolated *DISABLE* Input/Output. Input voltage may vary from 10-40VDC and the input current from 5-20mA according to V_{IN} .

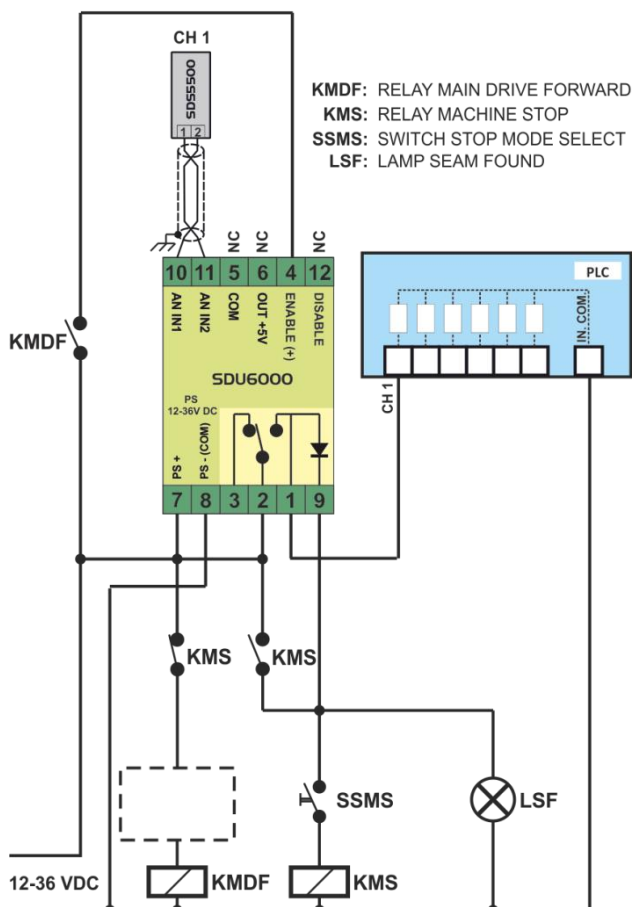
Refer to the connection diagrams and technical data for proper connection between the SDU6000 and your associated equipment.

!! Always cut the power off before connecting or disconnecting the unit. !!

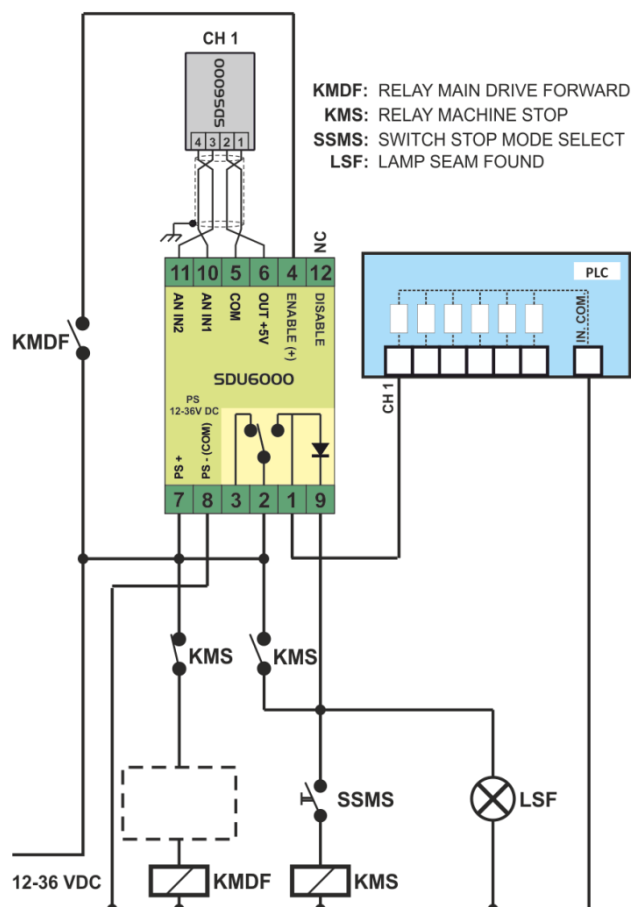
IO. APPLICATIONS

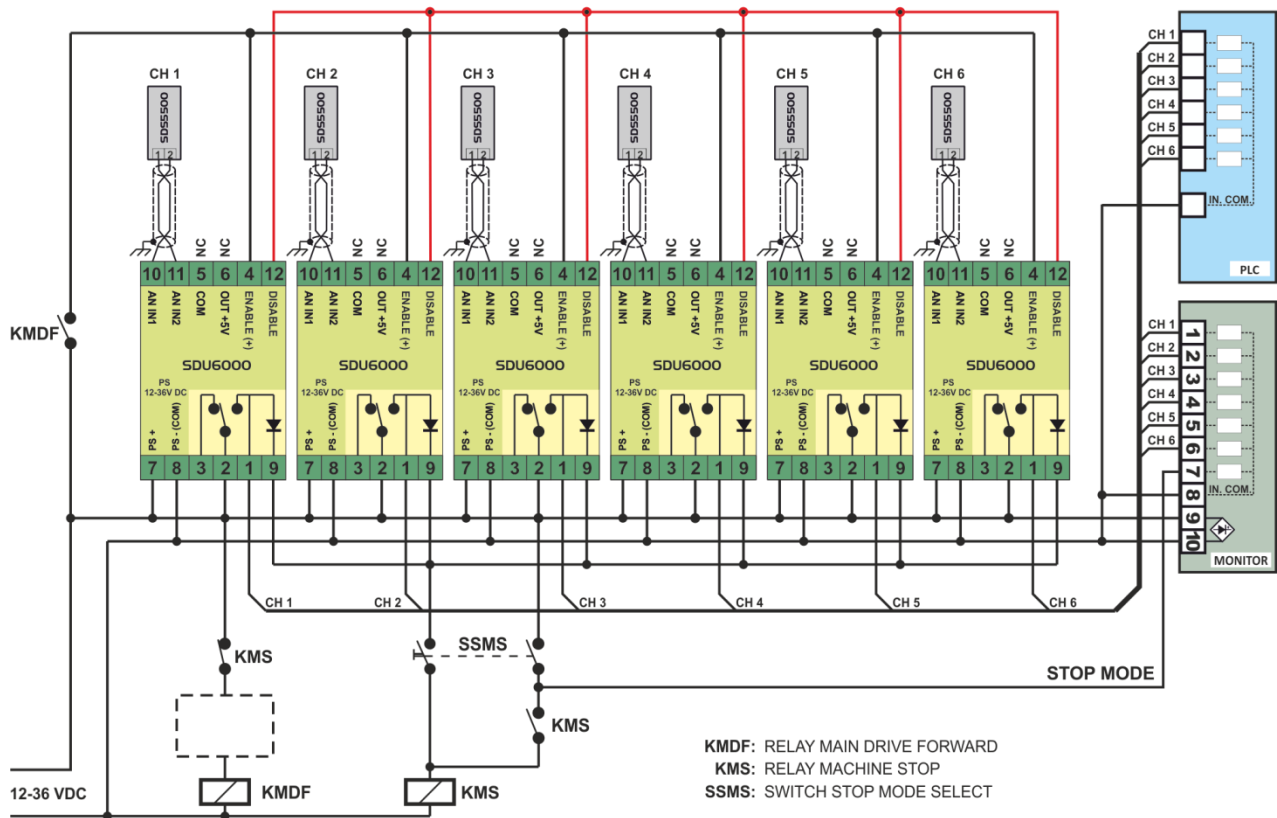
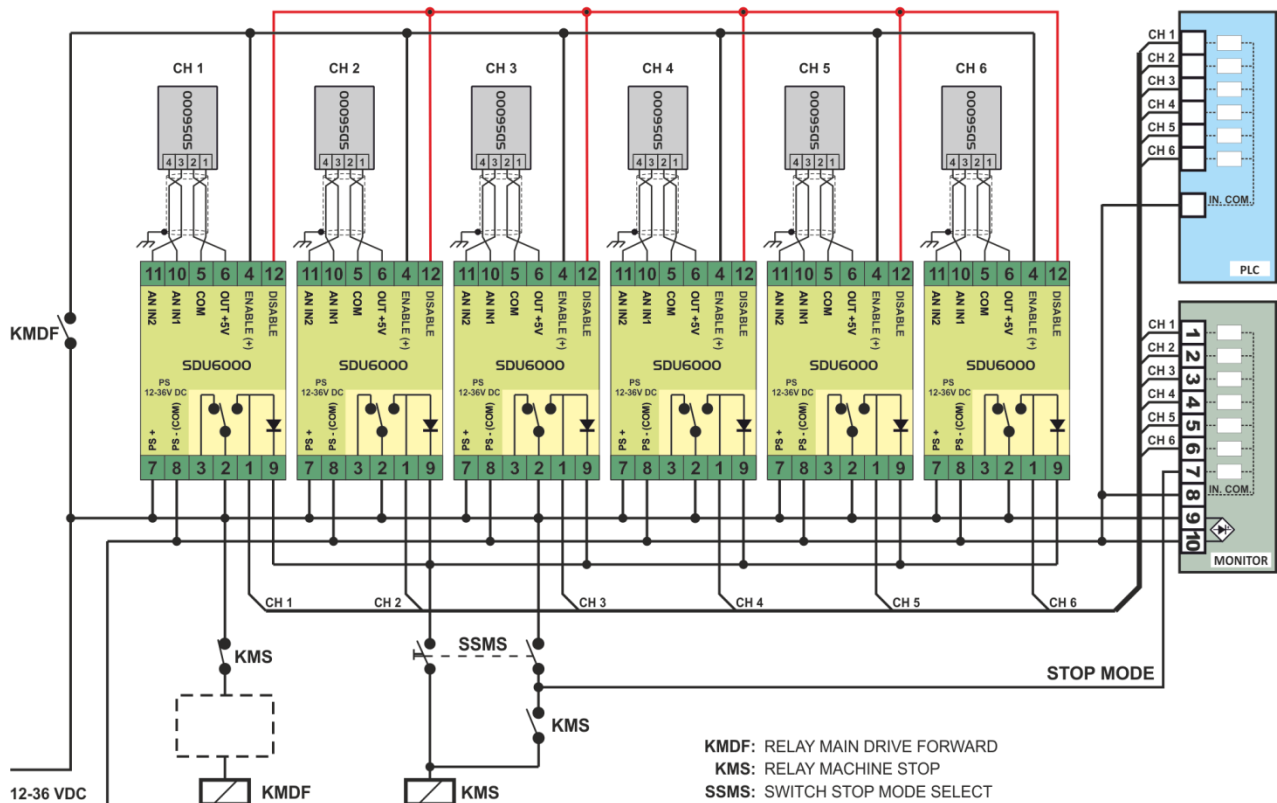
Below you can find some application examples using the SDU6000 with the sensors SDS5500/SDS6000.

TYPICAL APPLICATION FOR MACHINE WITH ONE CHAMBER - SDS5500

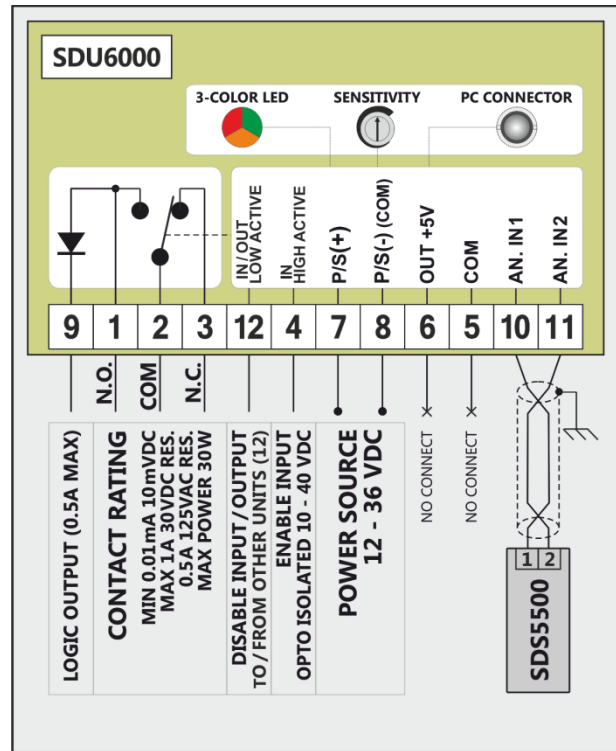
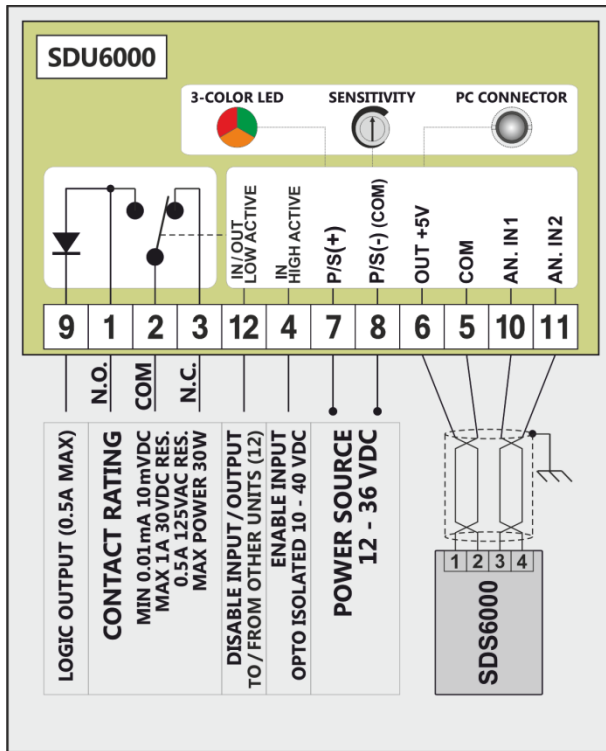


TYPICAL APPLICATION FOR MACHINE WITH ONE CHAMBER - SDS6000

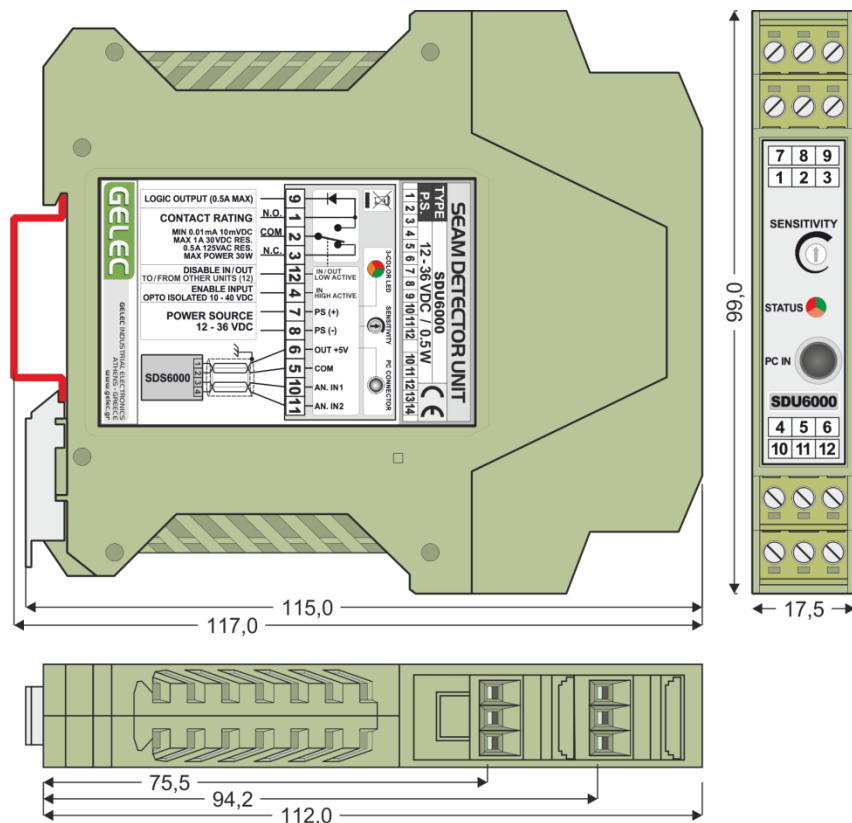


TYPICAL APPLICATION FOR MACHINE WITH SIX CHAMBERS (WITH SDS5500)

TYPICAL APPLICATION FOR MACHINE WITH SIX CHAMBERS (WITH SDS6000)


II. ELECTRICAL CONNECTION DIAGRAMS



12. DIMENSIONS



13. TECHNICAL SPECIFICATIONS

SDU6000 GENERAL DATA	
Unit dimensions (mm)	115 x 99 x 17,5
Weight	80 gr
Enclosure	Polyamide PA 6.6
Mounting	DIN rail NS35 (acc. to EN60715)
Degree of protection	IP20
Inflammability class	V0 (acc. to UL94)
Compatible Gelec SD Sensors	SDS5500 / SDS6000
Optional indication device	SD Monitor SDM6000
Features	
Detection distance	Up to 30 cm (SDS6000)
Maximum fabric speed	500 m/min (for higher speeds contact Gelec)
Enable / Disable inputs	Bipolar Opto-Isolated (10-40 VDC / 5-20 mA)
Digital output	1 x SPDT Potential free relay
Logic output	36V / 0,8A max.
Output signal duration	0,1 - 5sec (default 2 sec)
Interval between detections	5 sec
Magnet type	Alnico 5 (Ø8 - L40mm)
Seam Detection operating conditions	
Unit's operating temperature	-25 ... +85 °C (inside control panel)
Sensor's operating temperature	-20 ... +135 °C (depending on version)
ELECTRICAL DATA	
Operating voltage (AC values at 50/60 Hz)	12-36V DC
Power consumption	0.5 W max
Relay contact characteristics	
Resistance (initial)	Maximum 50 mΩ at 1A 6 VDC
Rating (resistive)	0.5A 125 VAC or 1A 30 VDC
Max carrying current	2A
Max switching power	62.5 AV, 30 W
Max switching voltage	250 VAC - 220 VDC
Max switching current	2A
Min switching load	0.01 mA 10 mVDC
Contact life	min 1x10 ⁸ operations (mechanical) min 5X10 ⁵ operations (electrical 1 A-30 VDC)
Connector characteristics	
Terminal block configuration	4 triple connector blocks in two rows (12 poles)
Pitch	5 mm

Wire range	28-12AWG (UL) , 0.25-2.5mm ² (IEC)
Tightening torque	0.4Nm(3.5Lb-In.)
Screws	M2.5, steel, Cr ³⁺ Zn plated
Contacts	Phosphor bronze
Cage	Brass, Ni plated
STANDARDS	
In conformance with the following standards:	CE

Specifications are subject to change without prior notice.



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