PGD100 Non-Contact Speed Detector Installation Manual

The **PGD100** is a non-contact speed measurement device, or ***Speed Detector,*** consisting of a Controller and Sensor Array(s). It is used when a contact encoder/tachometer will not work, as in cross-belt sorters or tilt-tray systems where a continuous belt surface is not available. The speed detector is designed to function as an encoder/tachometer replacement in certified dimensioning and scanning applications.

GENERAL VIEW

PGD100 Controller and Sample Array

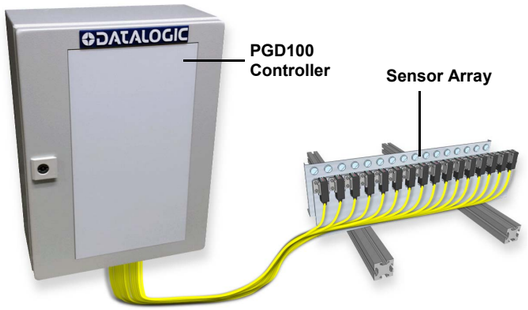

Figure 1 – General View

SAFETY PRECAUTIONS

ATTENTION: READ THIS INFORMATION BEFORE INSTALLING THE PRODUCT

This product is intended to be installed by Qualified Personnel only.

The power supplied to the PGD100 Controller is 24VDC +/-20%.

Current draw of the PGD100 is 50ma@24VDC (No Sensors attached)
Each sensor will add approximately 20 ma of current draw.

Example: PGD100 with a 15 sensor array will draw 350ma@24VDC

NOTE: To avoid electromagnetic interference:

- Connect CBX connection box Protective Earth (Earth) to a good earth ground.
- Connect the display device chassis to earth ground by mounting to a grounded conductive metal surface or by attaching a grounded conductive metal strap.

OVERVIEW

The **PGD100 Non-Contact Speed Detector** may use from 2 to 16 photoelectric sensors. The sensors can be of several types including, retro-reflective, through beam, and proximity, with some restrictions. The sensors are fixed to a tilt-tray or cross-belt sorting system in a straight line and approximately evenly spaced. The sensors are tripped successively by *flags*.

A flag is something attached to the conveyor system that can break the sensor's beam. For example, in a cross-belt or tilt-tray system there is often a metal fin that is positioned below each cell or carrier, which can be used as the flag. The sensors are positioned so the leading edge of the fin successively breaks each photo sensor beam. The distance between the flags is fixed and is set as a parameter at the factory. As the flag blocks the sensors' beams in succession, the system calculates the transport speed.

The PGD100 then outputs a pulse like that of a traditional encoder/tachometer, which a scanning/dimensioning system can use to determine conveyor speed. The default output provides 16 pulses/inch [16 pulses/25.4 mm] of conveyor travel, but output pulse length is configurable and can be modified by Datalogic prior to shipping. The output driver is an NPN open collector output. The duty cycle of the output signal is fixed at 50%.

The PGD100 is designed to output a speed signal only when the system is operating normally. If any anomalies are detected, the output will turn off.

Anomalies include:

1. Speed is too slow or too fast; i.e. < 0.15 m/s or > 3.5 m/s [<0.49 ft/s or >11.5 ft/s].
2. Speed variation between sensor pairs is too great (> 4.0% change)
3. Sensor signal stuck high or low
4. Too much time between flags (> 20 seconds)
5. More than one glitch within one carrier.

The speed detector is designed to handle an occasional glitch or missing pulse caused by a missing flag or debris (like spider webs). Multiple glitches on consecutive flags will cause an error condition and shut off the output.

MECHANICAL INSTALLATION

Mount the controller (using the mounting through-holes in the back of the cabinet) to a mounting structure or location near the sensor array. Install the sensor array according to application drawings for your system. Sensor array configuration will vary depending on conveyor type and manufacturer.

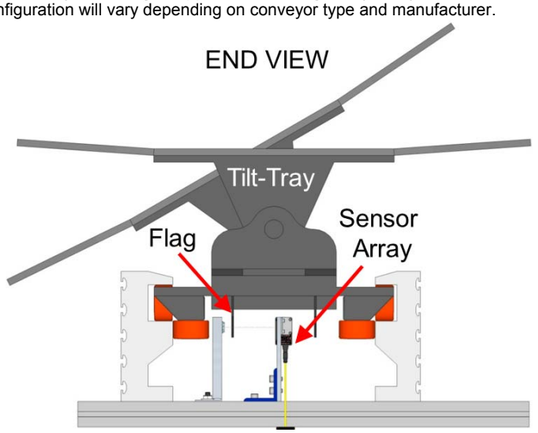

Figure 2 – Possible Sensor Array Configuration

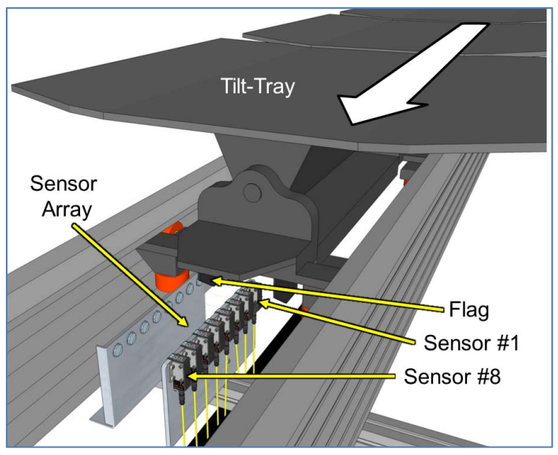

Figure 3 – Possible Sensor Array Positioning

ELECTRICAL INSTALLATION

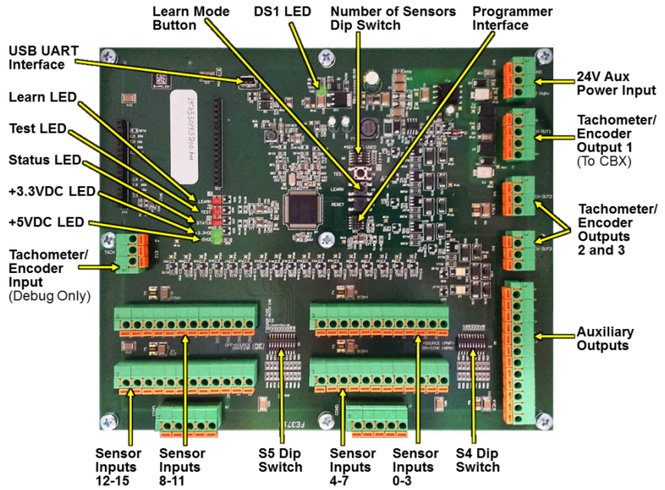

Figure 4 – PGD100 Controller Board

POWER

The PGD100 requires a 24VDC supply of power to operate. A CBX Connection Box powered by a DM3610 Dimensioner, AV7000 Camera, or other applicable Datalogic device is capable of powering the PGD100 directly for up to sixteen (16) Datalogic S8 photoelectric sensors.

To power the PGD100 using the CBX Connection Box, connect **TACH OUTPUT 1** as shown in *Figure 5 – Wiring PGD100 to CBX100/500* or *Figure 6 – Wiring PGD100 to CBX510,* depending on the CBX used. In addition, an auxiliary 24VDC input is provided for an external power supply on the PGD100 in case the CBX supply is not available or already heavily loaded. Under normal conditions an external power supply is not required.

WIRING TO THE CBX CONNECTION BOX

The PGD100 is typically shipped with the CBX cable wired into the controller board. The following diagrams show typical wire termination at both ends of the cable for the CBX100/500 and CBX510 Connection Boxes.

CBX100/500

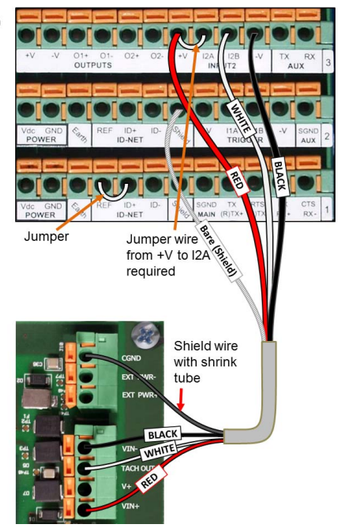

Figure 5 – Wiring PGD100 to CBX100/500

CBX510

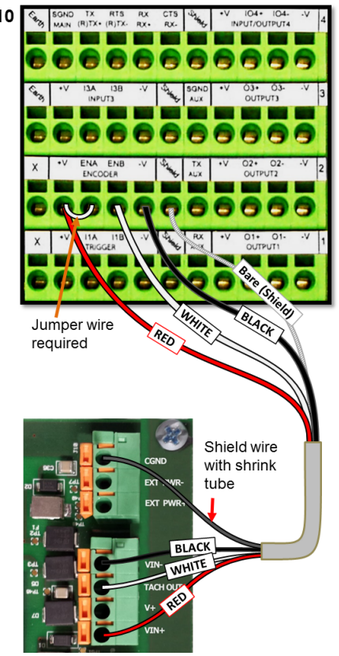

Figure 6 – Wiring PGD100 to CBX510

WIRING THE SENSORS TO THE CONTROLLER

Each sensor should have four wires connected – **Signal, V+, Ground,** and **Shield.** The following figure shows typical wiring into the PGD100 Controller.

IMPORTANT: The sensors must be wired so the first sensor the flag passes is sensor #1. Sensor #1 must always be the furthest upstream sensor.

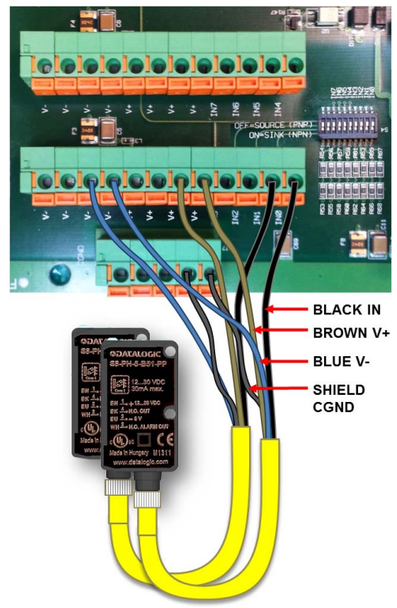

Figure 7 – Wiring Sensors to PGD100 Controller

DIP SWITCHES

Dip Switches **S4** and **S5** are used to select the photoelectric sensor type, NPN or PNP. All the sensors used in an array must be of the same type.

If NPN sensors are used, set all positions on **S4** and **S5** to **ON**. If PNP sensors are used, set **S4** and **S5** all positions to **OFF (as shown below)**.

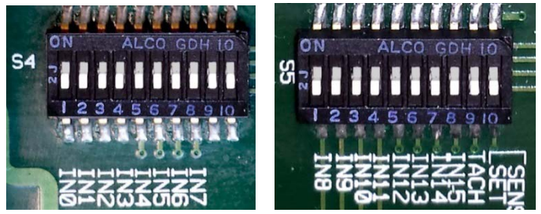

Figure 8 – S4 and S5 Dip Switches set for PNP sensors (OFF)

S5 position **9** is used to set the type of reference (input) tachometer/encoder. A reference tachometer/encoder is only used for debugging and development. Under normal use, the position of this switch doesn't matter.

S5 position **10** is the Master NPN/PNP switch. It should be set the same as S4 positions 1-10 and S5 positions 1-8.

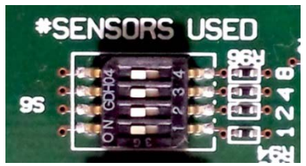

Figure 9 – S6 Dip Switches set to indicate a 15 sensor array

Dip Switch **S6** is used to set the number of sensors. Set **S6** according to the following table:

Number of Sensors	S6 Position 1	S6 Position 2	S6 Position 3	S6 Position 4
2	OFF	ON	OFF	OFF
3	ON	ON	OFF	OFF
4	OFF	OFF	ON	OFF
5	ON	OFF	ON	OFF
6	OFF	ON	ON	OFF
7	ON	ON	ON	OFF
8	OFF	OFF	OFF	ON
9	ON	OFF	OFF	ON
10	OFF	ON	OFF	ON
11	ON	ON	OFF	ON
12	OFF	OFF	ON	ON
13	ON	OFF	ON	ON
14	OFF	ON	ON	ON
15	ON	ON	ON	ON
16	OFF	OFF	OFF	OFF

NOTE: The Reference numbers 1, 2, 4, and 8 on the side of the **S6** dip switches can also be used to easily configure the switches. The sum of these reference numbers equals the number of sensors used, for example:

- If dip switches for reference number 2 and 4 are set to the **ON** position, 6 sensors are used… 2+4=6;
- If dip switches for reference number 2, 4, and 8 are set to the **ON** position, 14 sensors are used… 2+4+8=14.

LEDS

Six LED indicators are provided on the PGD100 Controller Board, **LEARN, TEST, STATUS, +3.3VDC, +5VDC,** and **DS1** (power). The function of the LEDs is shown in the table below.

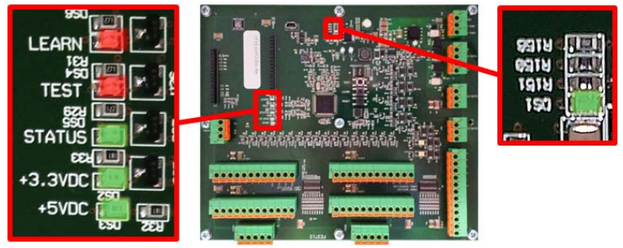

Figure 10 – LED Locations on Controller Board

Designator	Color	Function
DS1	Green	On solid if input power (24VDC) is within tolerance of +/- 20%
Group of 5 LEDs		
LEARN	Red	Blinks On/Off when learning calibration of sensor array
TEST	Red	Blinks when in test mode
STATUS	Green	On solid if everything is working correctly, otherwise it can be off or blinking intermittently if there is a problem. (**NOTE:** Some older units may use a Red LED)
+3.3VDC	Green	On solid if the 3.3VDC power rail is good.
+5VDC	Green	On Solid if the 5VDC power rail is good.

PUSHBUTTONS

Three pushbuttons are provided on the PGD100 Controller board for **TEST, LEARN,** and **RESET** functions. The pushbutton functions are described in the table below.

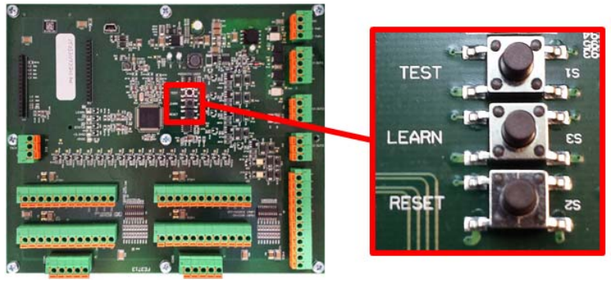

Figure 11 – Pushbutton Locations on Controller Board

The pushbuttons on the controller board have the following functions:

Button Name	Function
TEST	Press and release. Puts unit into test mode.
LEARN	Press and release. Used to calibrate sensor array.
RESET	Press and release. Causes a reboot of the processor.

SETUP AND CALIBRATION

If you are using the default factory set parameters, the following easy setup procedure can be used. The simplified process does not require connecting a PC to the PGD100 Controller via the USB UART.

NOTE: Contact **Datalogic Technical Support** if default settings need to be modified at www.datalogic.com.

Setup Procedure

1. Verify that the dip switches are set to match the number of sensors used *(see Figure 9 – S6 Dip Switches set to indicate a 15 sensor array)*. The dip switches are typically pre-set at the factory.
2. Verify that the NPN/PNP dip switches **S4** and **S5** are set to match the sensor type *(see Figure 8 – S4 and S5 Dip Switches set for PNP sensors (OFF))*. The dip switches are typically pre-set at the factory.
3. Verify that the master NPN/PNP dip switch, **S5** position 10, is set to match the sensor type *(see Figure 8 – S4 and S5 Dip Switches set for PNP sensors (OFF))*. The dip switches are typically pre-set at the factory.
4. Apply power by powering up the master device connected to the CBX Connection Box (Applicable Datalogic Dimensioner or Barcode Reader), or by applying power to the Aux 24VDC input.
5. Check the sensor connections by blocking each sensor one at a time (if possible). The **TEST** LED should turn on when each sensor is blocked *(see Figure 10 – LED Locations on Controller Board)*.
6. Turn on the conveyor system and allow it to come up to speed.
7. Push and release the learn pushbutton *(see Figure 11 – Pushbutton Locations on Controller Board)*. The **LEARN** LED should start to blink.
8. LEARN mode should complete after 10 to 30 carriers (Tilt-Tray or Cross-Belt cells) pass the sensor array. When the LEARN process is complete, the **LEARN** LED will stop blinking.
9. The **STATUS** LED should now be on continuously. If so, calibration was successful and the system is working.

   When working with a Dimensioner, be sure to adjust the tachometer/encoder **Pulses Per cm [in]** and/or **Tach Scale Factor** in the DM3610 User Interface **(Modify Settings | Tach / Trigger / Transmit)** to ensure the correct package lengths are detected. *(See the **DM3610 Dimensioner Reference Manual,** available at www.datalogic.com.)*
10. If the **STATUS** LED is off or is intermittent:
    - Make sure the **PGD100 Controller, Sensors,** and **CBX Connection Box** are wired correctly and securely.
    - Make sure the dip switches are in the proper positions for the application.
    - Confirm that the sensor array is wired so that the first sensor flag on the tilt-tray or cross-belt cell passes is **sensor #1,** followed by sensor #2, #3, and the other sensors in numerical order. *(See Figure 3 – Possible Sensor Array Positioning.)*
    - Repeat steps 1-9.
    - If the PGD100 Controller **STATUS** LED is still off or intermittent, contact **Datalogic Technical Support** on the Datalogic website at www.datalogic.com.

SUPPORT THROUGH THE WEBSITE

Datalogic provides several services as well as technical support through its website. Log on to www.datalogic.com and click on **SUPPORT > DIMENSIONER.** Then select your country and product model.

Downloads including documentation, software drivers, and utility programs and several links take you to additional services such as: Service Program which contains Maintenance Agreements and Warranty Extensions; Repair Centers; On-Line RMA Return Material Authorizations; Technical Support through email or phone; Downloads for additional downloads.

If you can't find your product in the list, enter the product name in the search box at the top.

COMPLIANCE

This product is intended to be installed by Qualified Personnel only.

POWER SUPPLY

When power is supplied from an auxiliary external source, this device is intended to be supplied by a UL Listed or CSA Certified Power Unit with Class 2 or LPS power source.

CE COMPLIANCE

CE marking states the compliance of the product with essential requirements listed in the applicable European directive. Since the directives and applicable standards are subject to continuous updates, and since Datalogic promptly adopts these updates, therefore the EU declaration of conformity is a living document. The EU declaration of conformity is available for competent authorities and customers through Datalogic commercial reference contacts. Since April 20th, 2016 the main European directives applicable to Datalogic products require inclusion of an adequate analysis and assessment of the risk(s). This evaluation was carried out in relation to the applicable points of the standards listed in the Declaration of Conformity. Datalogic products are mainly designed for integration purposes into more complex systems.
For this reason it is under the responsibility of the system integrator to do a new risk assessment regarding the final installation.

WARNING: This is a Class A product. In a domestic environment this product may cause radio interference in which case the user may be required to take adequate measures.

EAC COMPLIANCE

Customs Union:
The CU Conformity certification has been achieved; this allows the Product to bear the Eurasian mark of conformity.

FCC COMPLIANCE

Modifications or changes to this equipment without the expressed written approval of Datalogic could void the authority to use the equipment.

This device complies with PART 15 of the FCC Rules. Operation is subject to the following two conditions: (1) This device may not cause harmful interference, and (2) this device must accept any interference received, including interference which may cause undesired operation.

This equipment has been tested and found to comply with the limits for a Class A digital device, pursuant to part 15 of the FCC Rules. These limits are designed to provide reasonable protection against harmful interference when the equipment is operated in a commercial environment. This equipment generates, uses, and can radiate radio frequency energy and, if not installed and used in accordance with the instruction manual, may cause harmful interference to radio communications. Operation of this equipment in a residential area is likely to cause harmful interference in which case the user will be required to correct the interference at his own expense.

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