

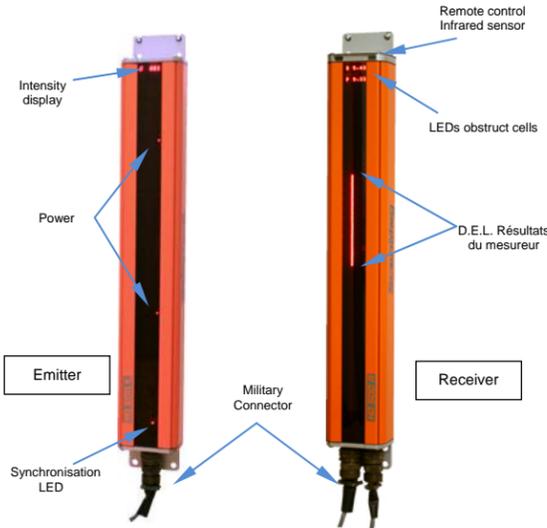
General Description

Type HD (or LD) scanner allows one to measure dimension and position of an object present in its field of view. The scanner is shipped with the following items:

- 1 x Emitter module
- 1 x Receiver module
- 1 x Receiver cable (D-1098-R-Cxx)
- 1 x Emitter Cable (D-1098-E-Cxx)
- 1 x Instruction manual

Physical description

The scanner is designed to display several type of information by using alphanumeric displays and LEDs. The following is a description of a type HD scanner:



4-20 mA Outputs

The 4-20 mA outputs are related to the scanner length (field of view). An output of 4 mA, will always be for a measured dimension or position of 0. An output of 20 mA, will always be for a measured dimension or position equal to the maximum detectable size or position. All other intermediaries values are linearly related to the maximum detectable size or position.

Scanner Model	Max. Dimension Metric (mm)	Max. Dimension Imperial (in.)
HD 250	256	10.08
HD 500	512	20.16
HD 750	768	30.24
HD 1000	1024	40.31
HD 1250	1280	50.39
HD 1500	1536	60.47
HD 1750	1792	70.55
HD 2000	2048	80.63
HD 2250	2304	90.71
HD 2500	2560	100.79
HD 2750	2816	110.87
HD 3000	3072	120.94
HD 3250	3328	131.02
HD 3500	3584	141.10
HD 3750	3840	151.18
HD 4000	4096	161.26

Table 1

Current closed loop analog input card will transform the above value into a digital number. This conversion to digital is normally done with a resolution of 10 to 16 bits. One can calculate this number by using the following equations:

IN_A * DIMmax / ValMax	Number of bits	Value (ValMax)
	10	1024
	12	4096
	14	16384
	16	65536

Table 2

IN_A 4-20 mA current output value converted into a digital number
 DIMmax Maximum dimension according to the scanner model (Table 1)
 ValMax Maximum value according to the number of bits used (Table 2)

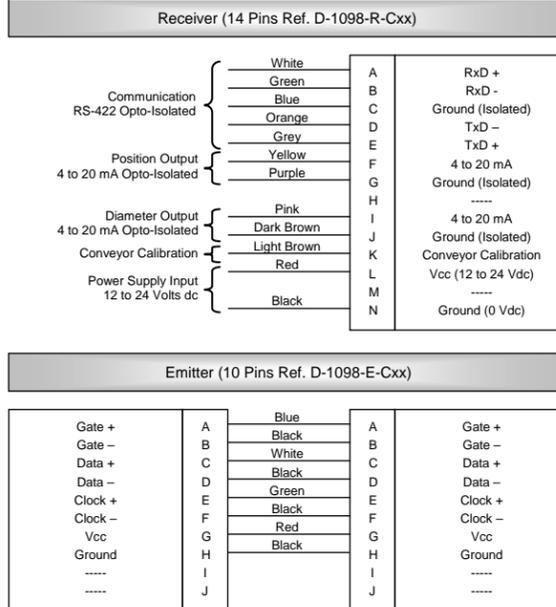
For example: if we have a 12 mA current loop output from a HD1000 and if the analog input card used 16 bits conversion; 12 mA will be 32768 in digital:

$$\frac{32768 * 40.31 \text{ in.}}{65536} = 20.16 \text{ in.} \quad \frac{32768 * 1024 \text{ mm}}{65536} = 512 \text{ mm}$$

Scanner installation

Install the receiver and its emitter face to face. For best possible operation, they must not be separated by a distance longer than (3 meters). However an installation with the smallest possible distance between them offers better dust immunity. The overall dimensions for the scanner are available in the section **LEDs Description** or on the drawing 5032-M-1-1-B (AutoCAD format).

Once emitter and receiver are installed, one must connect the emitter cable between emitter and receiver. This cable has two 10-pin military connectors one at each end and is identified by a sticker D-1098-E-Cxx where xx is the cable's length. Now one connects 14-pin receiver cable (Ref.: D-1098-R-Cxx) to the junction box (optional). This last cable is for power supply connection and all interconnection with exterior world: PLC, Computer, etc.. Cables pin out are the followings:



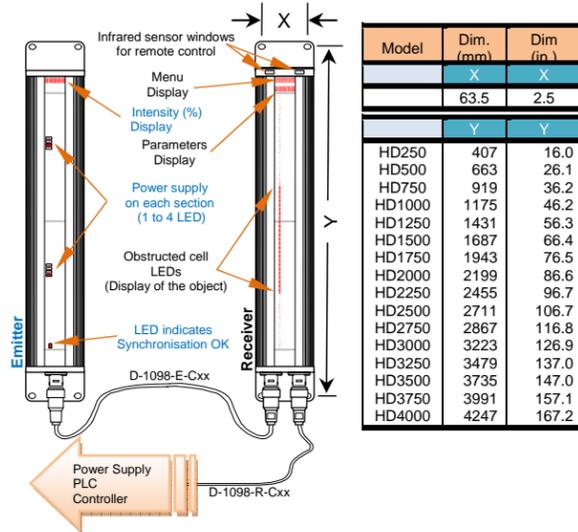
Power supply

For good operation, the scanner needs a power supply voltage between 12Vdc and 24Vdc. Current requirement will be between 1 and 4 amps according to the installed model.

Now it is time to power-up the scanner and insert an object of a dimension larger than 3 inches (75 mm) in its field of view. Each blocked cell will be displayed on the receiver side by the Obstructed cells LEDs. If a conveyor or structure blocks the bottom of the scanner, one will have to do a conveyor calibration in order for the scanner to detect the conveyor and ignore these associated cells.

LED description

Once the scanner has been powered-up, LEDs will light up at different location to indicate different information. The following LEDs will light up (the drawing is of model HD500 and it is similar to other models):



Buttons 0 to 9 are used only when the scanner asks for a valid code to enter the Monitor mode. As a parameter can have several values, one can scroll through the available values by using button + and - of PARAM section.

Button PWR allows one to toggle from one mode to another (Monitor ↔ Scanning).

ATTENTION ! If the remote control unit does not work, verify that the remote is in TV mode by pressing TV button. In the event that CBL/SAT button is pressed, buttons will no longer be recognized by the scanner and the remote control will appear to be inoperative. If it is in TV mode and the remote is still inoperative, check the batteries.

Scanning mode display

In scanning mode, only what is displayed can be changed, parameters can only be changed in monitor mode. Menu button is used to display results on the 2 available lines. Available displays are:

- Diameter value displayed only
- Position value displayed only
- Diameter and position value displayed (one on each line)
- Scanner model and software version displayed

Access to Monitor mode

To enter Monitor mode press PWR button. The scanner will then ask for an access code in order to validate that this button was not pressed by error. The access code is : 00000

If the entered code is a valid one, a message will indicate that access to Monitor mode has been granted, the scanner then enters Monitor mode. If the entered code is an invalid one, a message will state it and the scanner will stay in scanning mode. The scanner stays in scanning mode unless a valid Monitor access code is entered.

Returned to Scanning mode

If at anytime PWR button is pressed, the scanner automatically reverts to Scanning mode. Also if power is cut off, when power is restored, Scanner will power up in Scanning mode.

Conveyor Calibration

If a conveyor blocks part of the field of view of the scanner one must have a way of cancelling those cells. Once the conveyor calibration procedure has been successfully accomplished, the first active cell will be the first one just above the conveyor. All cells that were blocked by the conveyor will be treated as if they never existed.

The conveyor calibration procedure can be a hardware or a software one. The software calibration procedure will necessitate the use of the remote control unit; one can look up details about the usage of the remote control unit in the remote control section. To execute a conveyor calibration procedure, use one of the two following described procedures:

Hardware procedure :

- Turn the power « off » on the scanner.
- Put conveyor calibration input to GND (light brown wire).
- Make certain that there is nothing but the conveyor belt obstructing the scanner's field of view.
- Turn power to « on » on the scanner.
- For a better calibration make certain the conveyor is running for 10 to 30 seconds (optional) in order for the scanner to have the most cells blocked. If the conveyor is not running, please proceed to the next step.
- Disconnect conveyor calibration input (light brown wire) this input is to be left floating (no connection).

Warning: it is imperative that this input be left floating at all time during normal operation for the scanner to perform correctly.

Software procedure with remote control unit:

- Put scanner in Monitor mode (button PWR)
- Select calibration menu
- Make certain that nothing is in the scanner's field of view, except for the conveyor.
- Execute calibration command (ENT button)
- For a better calibration make certain the conveyor is running for 10 to 30 seconds (optional) in order for the scanner to have the most cells blocked. If the conveyor is not running, please proceed to the next step.
- Stop calibration mode in changing menu or by pressing ENT button.
- Go back to scanning mode (PWR button)

To undo the conveyor calibration, do a conveyor calibration without any object obstructing the field of view (no object or conveyor) or execute the reset command. Once a conveyor has been detected it can be seen on the receiver's obstructed cells LEDs.

Parameters and commands available (Monitor mode)

Scanning Algorithm

Indicates to the scanner how to interpret the measured data; the scanner can detect up to 3 objects present simultaneously in its field of view.

Biggest	Biggest object detected
Smallest	Smallest object detected
3x Add	Sum of up to 3 objects and position of first object
3x Obj.	Position and dimension of each object (3 max.) (serial link)
3x Ext.	External edges of 3 objects as if one continuous object

Scanning Unit

Imperial	In inches resolution of 1/100 inch (X.XX in.)
Metric	In millimeters
Type D HR	Number of 0.04 inch (ex.: 4 inches → 100)
Type D	Number 1/16 inch (ex.: 4 inches → 64) «Type D compatible»

Minimum Object Dimension

Minimum detectable dimension of the scanner. The bigger this number is set at, the faster the scanning rate will be:
Minimum: 20 mm / 0.8 in. **Maximum:** 100mm / 3.94 in.

Serial RS-422 Communication Speed

Selects RS-422 serial link communication speed (5 choices):
 9600 baud 19200 baud 38400 baud 57600 baud 115200 baud

Communication Protocol

Selects the scanner's communication protocol when in scanning mode.
 Hexa LF Hexa1_Ascii Hexa2_Ascii Hexa3_Ascii Hexa4_Ascii CR
 Binary LF Binary1_Binary2 CR
 BCD LF BCD1_Ascii BCD2_Ascii BCD3_Ascii BCD4_Ascii CR
Attention: Maximum BCD value is 9999 thus 99.99 inches for imperial. Further more if Type D or type D HD has been selected, only 3 Bytes Hexa are transmitted as opposed to 4 for the standard Type HD (protocol Hexa).

Emitter LED Intensity

Emitter Led Intensity command is used to minimize potential reflections due to the scanner installation in its environment. The intensity is displayed in percentage and can be set between 1 and 100%. Cells Verification command is integrated into Emitter Intensity command. One sees immediately the result of this command on the intensity of the emitter. The selected intensity is set in memory only when ENT button is pressed. If one exits this menu without pressing ENT button, emitter reverts to the original intensity.

Cell Verification

This command allows one to verify the state of each cell of the scanner. After execution of this command each cell status is displayed on the Obstructed Cells LEDs. One can start or stop execution of this command at any time.

Scanner's operating modes

Type HD scanner has 2 operating modes. These 2 modes are:

Scanning mode:

This is the default mode of the scanner. When powered up, the scanner is in this mode no matter the mode it was in before shutdown. In this mode, the scanner measures any object present in its field of view and transmits dimension and position data continuously according to the chosen parameters. These data are available on the RS-422 serial link output or on the Analog closed current loop (4-20mA) outputs.

Monitor mode:

This mode allows one to visualize or modify the scanner's parameters. It also allows one to verify the state of the scanner and its functionality according to the selected parameters. One has access to these diagnostic tools or the parameter's menu via a serial link communication protocol or simply by using the Sony universal remote control unit.

Scanner's inputs and outputs

Type HD scanner has several inputs / outputs to accurately measure an object present in its field of view. These inputs / outputs features allows one to easily visualize or diagnostic the good operating state of the scanner. These Inputs/ Outputs are:

Bidirectional RS-422 serial link:

This serial link allows the scanner to transmit data consisting of the dimension and position of an object present in its field of view. It allows one to communicate (Monitor mode) with the scanner to visualize and modify scanner's parameters.

Analog output #1 (4-20mA) indicates the position:

This closed-loop current output indicates the position of an object detected in the scanner's field of view.

Analog output #2 (4-20mA) indicates the dimension:

This closed-loop current output indicates the dimension of an object detected in the scanner's field of view.

Infrared input for the remote control unit:

This input detects infrared code sent by a universal remote control unit. Also with this input, one can visualize and modify parameters and verify the operational state of the scanner.

Activation of alternative Cells

This command allows one to use an alternative cells list. This list is found by using Detection of Alternative Cells command. When disable the list shows the true status of each cell. This command can be either enabled or disabled.

Detection of Alternative Cells

This command allows one to find alternative cells in the event that one or several emitter cells are not working properly. After execution of this command, the scanner will have the same resolution as a fully functional scanner. A maximum of 8 cells can be found and corrected with this command. One must select Execute and then parameter Yes. The message OK (x) will appear with the number of bad cells (x).

Analog Output Test (4-20 mA)

This command tests the analog 4-20 mA closed loop current outputs. One can output a 4 mA to 20 mA current in a 1 mA increment.

Parameters Reset to Default Value

This command will reset all parameters to their default value. Select Execute and then select « Yes » to confirm. When completed the message «Done» will appear. **Use this command as a last resort.**

Conveyor Detection

This command allows one to find a conveyor or possible structures or objects present at either end of the scanner. The blocked cells will be treated as they do not exist anymore.

Show Conveyor Position on LEDs

This command allows one to display, using the Obstructed Cells LEDs, cells that were cancelled by the execution of Conveyor Detection command.

Display Language

Display language selection. Available languages are English and French.

Scrolling Display Speed

Adjust Scrolling Display Speed. Three choices: Slow, Normal and Fast.

Display Intensity

Adjust display intensity according to ambient lighting. Display Intensity can be set from 1 to 7; 7 being the brightest intensity.

Menu Style Display

Allows someone, who is familiar with the scanner, to set the display menu in an abbreviated format without scrolling. For scrolling choose Normal and for a shortened display menu format choose Short.