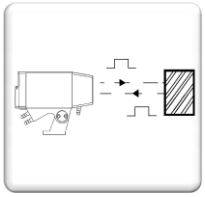
Time of flight LASER DISTANCE MEASUREMENT

Dilas FT

FT1800

Digital communication: Profibus-DP, Profinet, Ethernet Modbus-TCP, EtherNet/IP

PROFIBUS® EtherNet/IP PROFINET® Modbus



High temperature targets - Long range – High accuracy

Easy setup and installation

Design for steel industry conditions

Lt 1460

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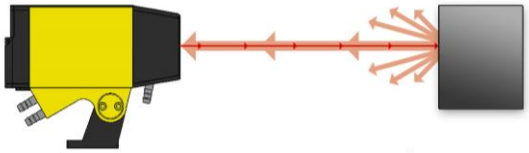
Introduction

The **Dilas FT1800** is a digital, high performances, non-contact laser distance measurement or detection sensor. The target may be hot or cold, stationary or moving. **Dilas FT1800** measures on all non-shiny surfaces.

The operation of the **Dilas FT1800** is based on time-of-flight measurement. The sensor calculates the distance of the target surface using the time of flight of visible laser light pulses.



The measurement is delivered on an analogue output or on the digital communication.

Presentation

The **Dilas FT1800** is an autonomous sensor mounted in compact aluminium housing, IP66. The sensor can be ordered with mounting bracket or mounting stand and water-cooling jacket.

A digital display indicates the measured distance and two LED indicate status of sensor.
For the models with digital communication, two additional LED indicate the communication link status.

The sensor can work as a standalone unit: in that case, the setup is made from the control panel at the back of sensor.

Features and benefits

- Three models are available to suit your application:
  - **1 mW Class 2 laser** – efficient for standard applications
  - **5 mW Class 3R laser** – higher power for higher distance and low remission target
  - **5 mW Class 3R laser** with **High Temperature Filter** – optimized performance for high temperature targets
- Target temperature: up to 1350 °C
- Analogue output : 4-20 mA
- Digital communication : Profibus-DP, Profinet, Modbus-TCP, EtherNet/IP
- Visible red laser beam
- Autonomous sensor: ready to use, no calibration required
- Integrated 5 digits display
- Easy sensor setup with pre-set distances selection
- Extended configuration of customized measuring range and response time
- Special modes ('Time') optimized for: Detection / Tracking / Averaging / Fixed Sampling
- Optional Water cooling & air purging – Optional Heat Shield & additional cooling plate.

Applications

The **Dilas FT1800** offers different modes optimized for different applications. The setup of the mode is very easy and quick via the back panel selector in the "Time" position. Be sure to select the mode adapted to your own situation:

- **Auto mode** gives measurement as soon as it is available with the best accuracy. The measuring time is not fixed and depends on the measurement conditions: reflectivity of the target, distance. If the measurement is not possible, the sensor delivers an error code after maximum 6 seconds.

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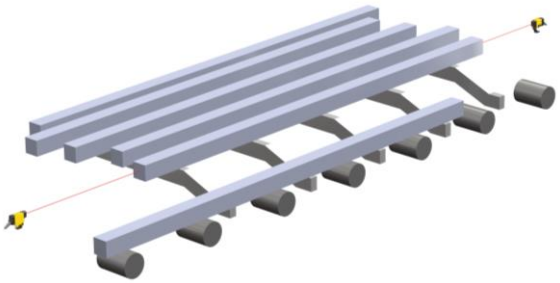
- **Fixed sampling time** allows user to get a repeatable and fixed measuring time: the target needs to be always measurable within this fixed time to use this mode, otherwise some error code may appear.
- **Tracking mode**: when the target is moving in the axis of the sensor, this mode is recommended and provides better results and refreshment time.
- **Detection mode** is interesting for applications where product or background is not measurable within a fixed time. Instead of freezing the detection output and the measurement value like for other modes, the FT1800 in detection mode will release the output and measurement after the fixed time.
- **Average mode** makes a moving average (x2 or x4) of the last values, to get a more stabilized and accurate measurement.

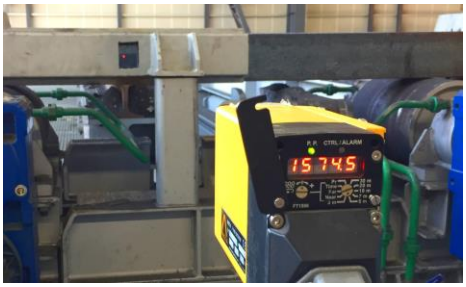
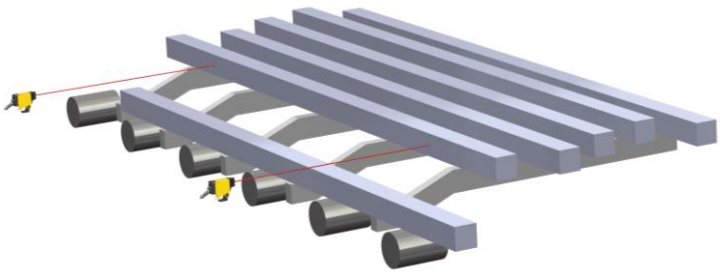
Note: if a window glass is used in front of the **Dilas FT1800** (like in furnace application), it should be installed with an angle 5° to 10° to avoid reflections and possible errors or wrong measurements. The glass should have air purging protection and be clean.

Typical Applications

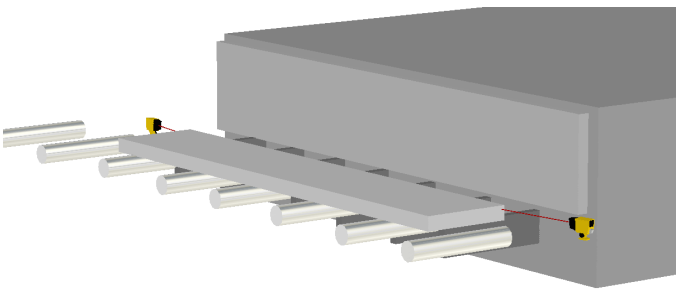
↳ Length measurement


↳ Position measurement

↳ Position measurement before furnace charging

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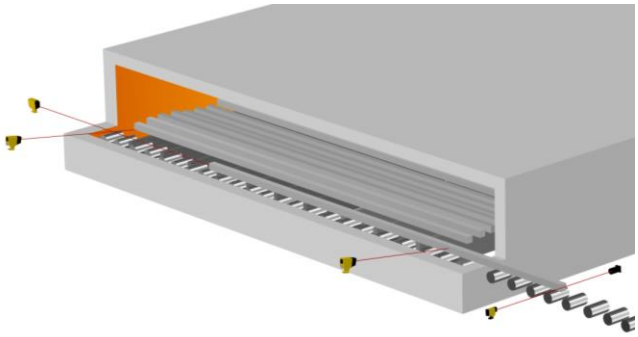
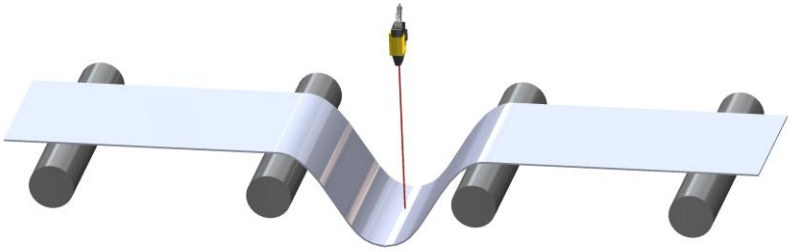
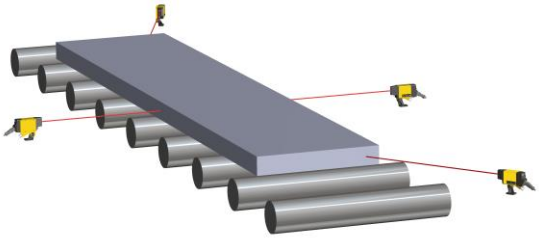
↳ Length & position measurement at furnace entry



↳ Strip loop control in furnace

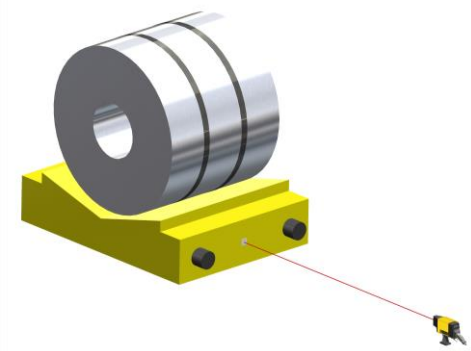


↳ Static slab dimensions measurement

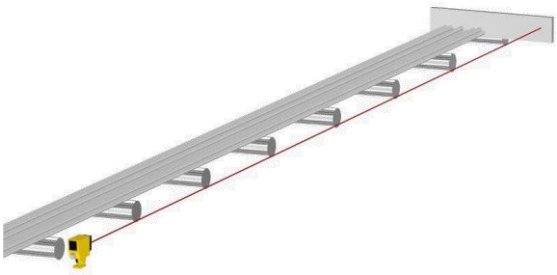


↳ Hot product position measurement

↳ Transportation cart position measurement



↳ Stop position control



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Technical specifications

Model		FT181•-••	FT185•-••	FT189•-•••
Laser (IEC 60825-1:2014)		≤1 mW Class 2,650 nm	≤ 5 mW Class 3R, 650 nm	≤ 5 mW Class 3R, 650 nm with HT Filter
Beam divergence / Spot diameter		0.6 mrad / 6 mm at 10 m ; 30 mm at 50 m ; 60mm at 100 m		
Maximum target T° *(1)*		1000 °C (1832 °F)	1200 °C (2192 °F)	1350 °C (2462 °F)
Measurement Range vs Surface - Black surface (6% remission) - Natural surface, grey (13% remission) - White matt surface (80% remission)		 0.3 to 25 m 0.3 to 30 m 0.3 to 80 m	 0.3 to 30 m 0.3 to 35 m 0.3 to 100 m	
Measuring accuracy *(2)* (resolution 0.1 mm)		± 1 mm typical ± 1.5 mm (+15 °C up to +30 °C / +59 °F up to +86°F) ± 2.5 mm (-10 °C up to +50 °C / +14 °F up to +122 °F)		
Measuring time vs Mode	Auto	Automatic, depending on surface. Typical: 0.25 – 0.5 sec *(3)*		
	Tracking	20 - 125 ms		
	Detection	300 - 600 ms		
	Fixed sampling	300 - 600 ms		
	Average	300 - 600 ms (moving averaging x2 or x4)		
Target speed		Max 4 m/s (Tracking mode)		

(1) The HT filter reduces receiver glare and can improve position measurement of products at very high temperatures or inside furnace. Note that performances may be affected by a combination of factors such as air turbulences, flames, distance, presence of scale, or product movement…
(2) At 1 sigma (statistic spread 68%)
(3) In the most difficult applications such as very high temperature target or very low remission, it is recommended to use Auto mode: the sensor increases the response time to 1 to 3 seconds to get the measure, and if the measure is not possible up to 6 seconds.

Laser Class 2
Laser Class 3R

Model	FT18•1-••	FT18•2-•C	FT18•3-•C	FT18•4-•C	FT18•5-•C
Communication protocol	-	Profibus-DP	Profinet	Modbus-TCP	EtherNet/IP
Communication link	-	2 status LED			
Analogue output	4-20 mA (500 Ω max.) ±0.1% temperature drift 50ppm/°C				
Digital output (x3)	3x PNP "High side" 50 mA: - Product presence (PP): 24 V in presence of product - Alarm (AL): 24 V in case of internal failure / temperature - Control (CT): 24 V in case of too low margin (only FT18•1)				
Display	5 digits LED display, 2 status LED				
Setting	2 rotary switches to: ∗ choose between preconfigured fields ∗ select & adjust measuring range, address & mode (Tracking, Detection, Averaging, Fixed Sampling) Setting can also be done via communication link (FT18•4)				
Operating voltage / Power consumption	VDC: 10 to 30 VDC / 10 W max. VAC: 115 V (-15%) to 230 V (+10%) – 50/60 Hz / 5 VA (only available on FT18•1- •C)				
Cable	Power supply and analogue outputs cable: connector fitted with silicone cable with protective steel braid. Standard length of 2 m (other length: 3, 5 or 8 m) Communication cables: not included, see Accessories				
Weight	2.6 kg (FT18••- LB) - 3.0 kg (FT18••- JC)				
Protection rating	IP 66 (cast aluminium case)				
Air Purging	Protection of the optic with clean air: 50 to 200 g/cm², 4 to 16 l/min				
Operating temperature *(4)*	-10 °C to 50 °C (14 °F to 122 °F) without cooling. Up to 120 °C (250 °F) with water cooling: industrial quality water at about 25 °C (77 °F), pressure 1-2 bar and flow 1-2 l/min.				

(4) To increase the lifetime of laser module, it is recommended to cool the sensor with water as soon as operating temperature is > 45°C (113°F) and to switch off the sensor when it's not in operation for many hours.

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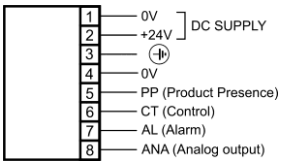
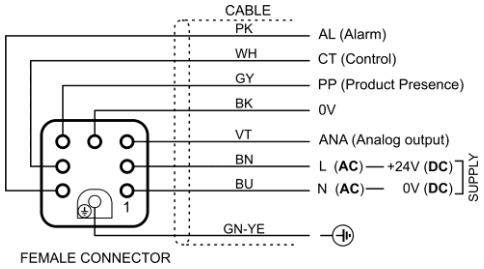
Connection

Models with 4-20mA output:

Terminal Block (FT18•1-•B)

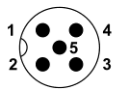


Connector (FT18•1-•C)



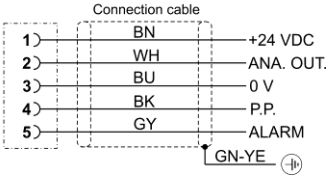
Models with 4-20mA output & communication protocol:

POWER SUPPLY & I/O
5 PIN A-CODED
MALE CONNECTOR

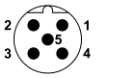


1 : +24 VDC	
2 : ANA. OUTPUT	
3 : 0 V	
4 : PRODUCT PRESENCE (P.P.)	
5 : ALARM	

Connection cable



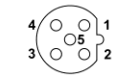
PROFIBUS IN
5 PIN B-CODED
MALE CONNECTOR



1 : NC✶	
2 : PB_A_IN	
3 : NC✶	
4 : PB_B_IN	
5 : ⏚	

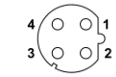
✶ NOT CONNECTED

PROFIBUS OUT
5 PIN B-CODED
FEMALE CONNECTOR



1 : 5 V BUS	
2 : PB_A_OUT	
3 : 0 V BUS	
4 : PB_B_OUT	
5 : ⏚	

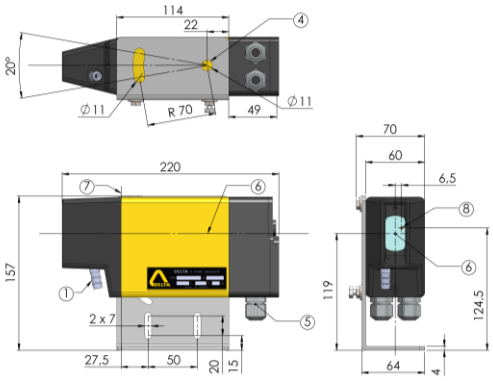
Ethernet Protocols:
- PROFINET
- Modbus-TCP
- EtherNet/IP
4 PIN D-CODED
FEMALE CONNECTOR

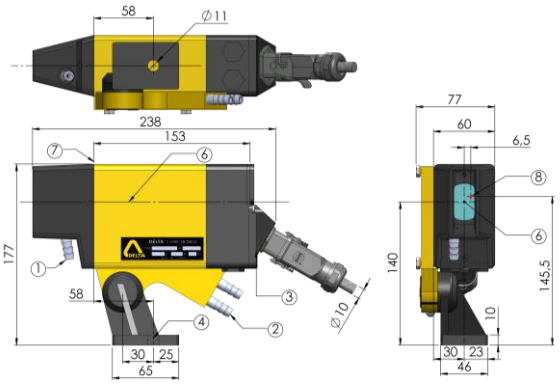


1 : TD+	
2 : RD+	
3 : TD-	
4 : RD-	

Dimensions

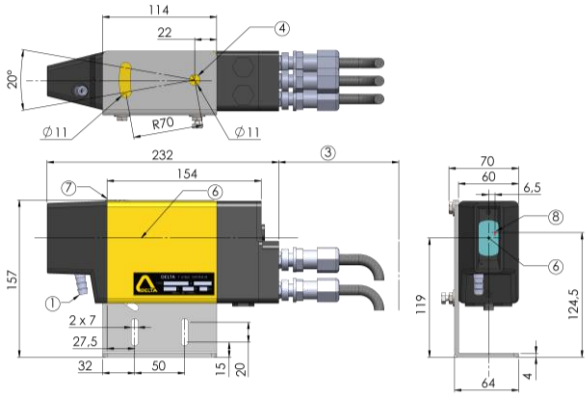
Models with 4-20mA output:

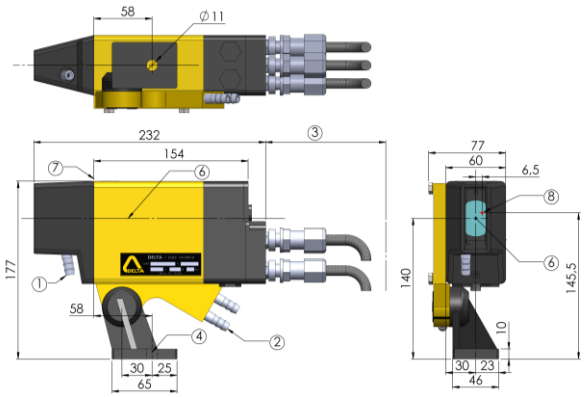




① Air supply Ø 10
② Water supplies Ø 10
③ Connector clearance 120 mm
④ Mounting with screw Ø 10
⑤ 2 cable glands (cable Ø from 7 to 10.5 mm)
⑥ Optical axis
⑦ Measurement Ref.
⑧ Laser axis

Models with 4-20mA output & communication protocol:





③ Connector clearance 140 mm

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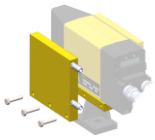
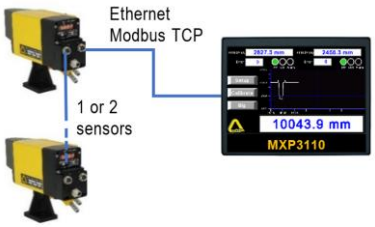
Accessories

For all models

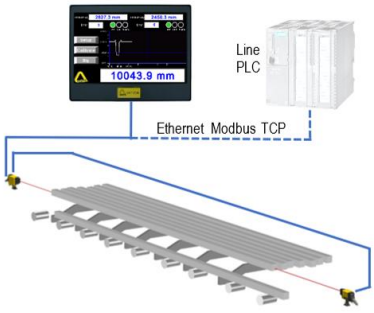
Description		Reference
Heat shield to protect from direct radiation. Only compatible with Mounting stand & cooling jacket (FT18••-J•)		7093146
Additional cooling plate Only compatible with Mounting stand & cooling jacket (FT18••-**J**•)		7094605

For models with Modbus-TCP (FT18●4):



Remote Display unit
(connection to 1 or 2 sensors)
For display on the operator pulpit for cut to length application for example, or in case the access to the sensor is difficult or dangerous.
Display of sensor measurement, status and error code.

Remote Display unit with 1 dimension static calculation
(connection to 2 sensors)
- For calculation and display of 1 dimension: width, length, thickness. (The target must stop for a few seconds during measurement.)
- Calibration procedure (distance between sensors & correction coeff.).
- Display of sensors measurements, status and error code.
- Dimension value and calibration parameters stored in each sensor for access through Modbus TCP.



Description		Reference
Standalone display unit To be mounted in an existing panel (delivered with a M12-RJ45 adapter – ref 2537506)		MXP3110 24 VDC
Complete **junction box** including: - 1 Ethernet Switch, - Terminal blocks, - 115/230 VAC to 24 VDC power supply Equipped with: - 2 M12 connectors for power supply & I/O of sensors, - 2 M12 Ethernet connectors,		CR1800FT 115-230 VAC CR1800FT 24 VDC
Power & I/O cable to connect FT18•4 to junction box: with M12 Male & Female M12 connectors, 5 pins, A-coded, straight.		2 m: 7540462 3 m: 7540463 5 m: 7540464 8 m: 7540465

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For models Dilas FT18•2 (Profibus-DP)

Description			Length	Reference
A side connector of Profibus cable: Male, M12, 5 pin B-coded, Straight	B side connector of Profibus cable: Female, M12, 5 pin B-coded, Straight		2 m	7540296
			3 m	7540297
			5 m	7540290
			10 m	7540298
			15 m	7540457
			20 m	7540299
Termination resistor for Profibus (male connector M12, B-coded)				2536756

For models with Ethernet protocols (Profinet, Modbus-TCP, EtherNet/IP)

Description			Length	Reference
A side connector of Ethernet cable: Male, M12, 4 pin D-coded, Straight	B side connector of Ethernet cable: Male, M12, 4 pin D-coded, Straight		2 m	7540273
			3 m	7540276
			5 m	7540277
			10 m	7540278
			15 m	7540291
			20 m	7540279

Reference for order

Dilas F T 1 8 • • - • • ••• L = •

Laser power	***ANA output / Communication***	***Mounting***	***Connection*** *(1)*	***Power Supply*** *(2)*	***Cable length*** *(3)*
1 : ≤1 mW	**1** : 4-20 mA	**L** : Bracket	**B** : Terminal Block	24 VDC	**2** : 2 m (standard length)
5 : ≤5 mW	**2** : 4-20 mA + Profibus-DP	**J** : Mounting stand & Cooling jacket	**C** : Connector	115-230 VAC	**0** : no cable with connector
9 : ≤5 mW + HT filter	**3** : 4-20 mA + Profinet				3 : 3 m
	4 : 4-20 mA + Modbus-TCP				**5** : 5 m
	5 : 4-20 mA + EtherNet/IP				**8** : 8 m

*(1) Terminal block only available for FT18•**1**-•B*
*(2) Power supply 115-230 VAC only available for FT18•**1**-•C*
*(3) Cable not available for FT18•**1**-•B*

Example: **FT1812-JC 24VDC L=2**: Dilas FT1800 sensor with 1mW laser, 4-20mA analogue output, Profibus-DP communication, mounting stand & cooling plate, 2 m cable with connector for power and analogue output (communication cables not included).

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