SmartGen

MAKING CONTROL SMARTER

HTL SERIES

(HTL02A/HTL04A)

ENGINE OIL HEATER

USER MANUAL

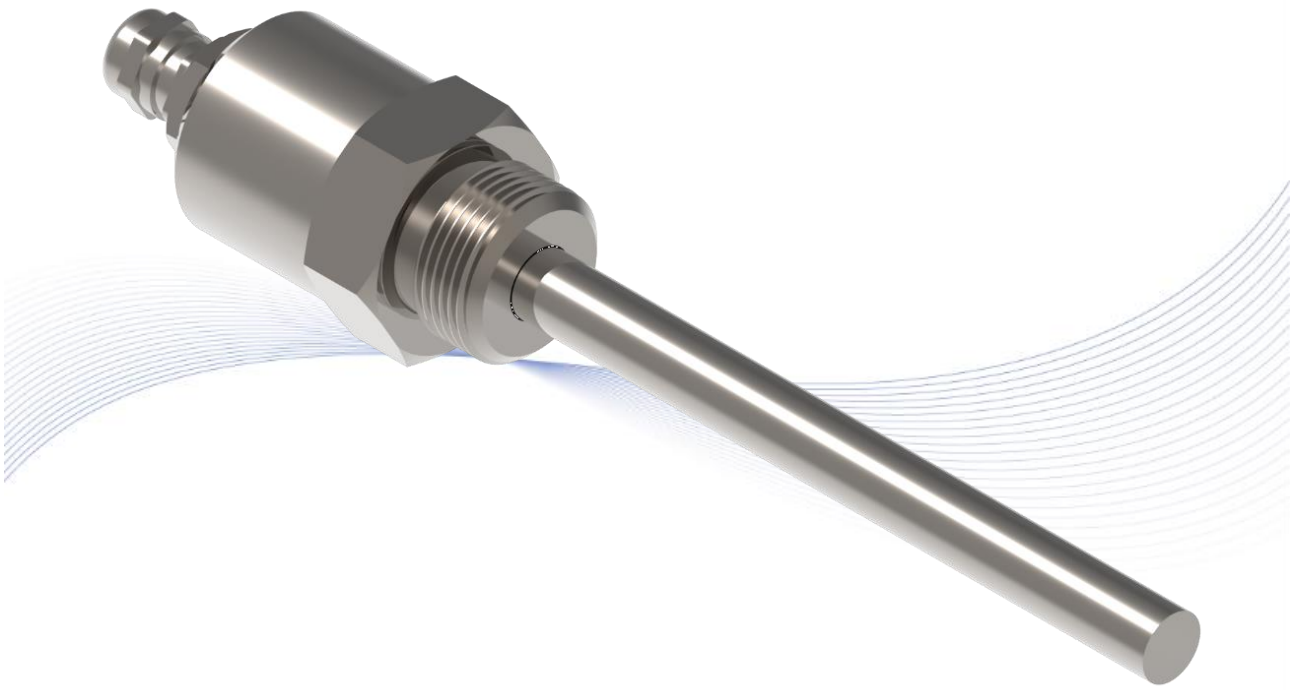

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Table 1 Software Version

Date	Version	Content
2021-01-27	1.0	Original release.
2023-02-20	1.1	Updated the Logo of SmartGen.
2024-03-19	1.2	Updated the figure of case and installation dimensions; added calculation instructions of heating time.

CONTENTS

1 OVERVIEW

During cranking, if the outside temperature is lower than 4ºC, engine lubricant may lose its lubricating properties, which can damage the engine. Engine oil heater should be installed to ensure normal starting and running of the engine when the outside temperature is lower than 4 ºC.

HTL series engine oil heater adopt cast stainless steel inner pipes and end closure with high corrosion resistance.

This product is suitable for various engines with (2~110)L engine oil volume.

2 PERFORMANCE AND CHARACTERISTICS

a) Stainless steel inner pipes and end closure with high corrosion resistance and solid features;

b) The inner pipes have long service life with the benefit of the low power of the unit areas.

c) All-in-one design, compact structure and small volume.

3 SPECIFICATION

Table 2 Standard Model Parameters

Model	HTL02A-□	HTL04A-□
Rated Power	238W	400W
Rated Voltage	AC 240V	
Rated Current	1A	1.67A
Engine Oil Volume	2~50L	50~110L
Default Thermostat	Off：50ºC On：35ºC	
Insulating Resistance	≥50MΩ	
Electrical Strength	AC 1.5kV 1min Leakage Current≤2.5mA	
Installation Dimensions	Thread outer diameter range see Table 3	
Max. Pressure	0.5MPa	
Protection Level	IP65	
Vibration Resistance	5 ~ 8 Hz: 17mm 8 ~100 Hz: a=4g 100-500 Hz: a=2g IEC 60068-2-6	
Shock Resistance	50 g, 11 ms, Half-sine Wave, complete shock tests from three directions, with a total of 18 shocks per test. IEC 60068-2-27	
Collision	25 g, 16 ms, Half-sine Wave IEC 60255-21-2	
Case Dimensions	195mm×43mm×43mm	255mm×43mm×43mm
Weight	550g	590g

Table 3 Thread Outer Diameter Selection

Thread Specification	Thread Code
Metric Thread	M20、M22、M24、M26、M27、M30、M33
G Thread	G1/2"、G5/8"G3/4"、G1"
NPT Thread	NPT 1/2
	NPT 3/4
	NPT 1
Others	Thread outer diameter range Φ22-Φ33.5mm

Example: HTL04A-M27×1.5 indicates that the installed thread of 400W engine oil heater is M27×1.5.

4 CONNECTIONS

---- After open the back cover, please connect the wire according to the label E N L on the terminal, E: earth line, N: null line, L: live line.

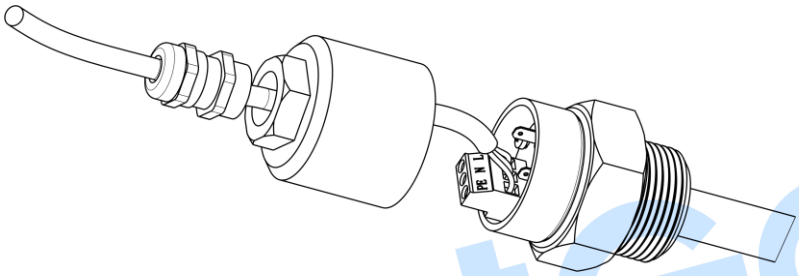

Fig.1 – Internal Wiring Example

---- Heat resisting power line is strongly recommended, outer diameter range 4~8mm, and the nominal cross-sectional area 1 mm^2.

---- Earth line must be soundly connected to earth.

5 CALCULATION OF HEATING TIME

The heating time is equal to the total heating divided by the amount of the heat can be provided per unit time.

t =Q/P

Q =cm（T1- T0）

P: heater power, Unit: W;

Q: Total Heat, Unit: J;

C: Specific Heat Capacity, Unit: J/kg• ºC;

M: Mass, Unit: kg;

t: Heating Time, Unit: s;

T0: Start Heating Temperature, Unit: ºC;

T1: Stop Heating Temperature, Unit: ºC;

Take the example of a 40kg lubricating oil to be heated from 20 ºC to 50 ºC by 400W heater, the time required is illustrated as follows:

Q =cm（T1- T0）

$=1.87\times10^3\times40\times（50-20）$

$=2.244\times10^6$ J

Heating time $=2.244\times10^6\div400$

=5610s

≈94 min

The real heating time: ≈94×20%=113 min

Remark: the above is theoretical calculation time, the heating tube efficiency, heat transfer efficiency

and heat loss factors are not considered, so the real heating time can be increased by 20% on basis of theoretical time.

6 CASE AND INSTALLATION DIMENSIONS

Unit: mm

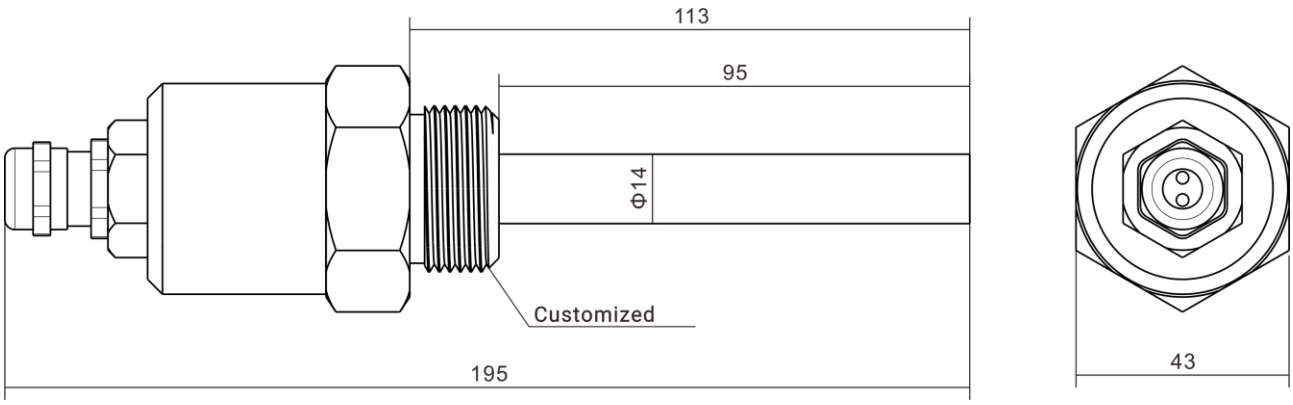

Fig.2 – HTL02A Case and Installation Dimensions

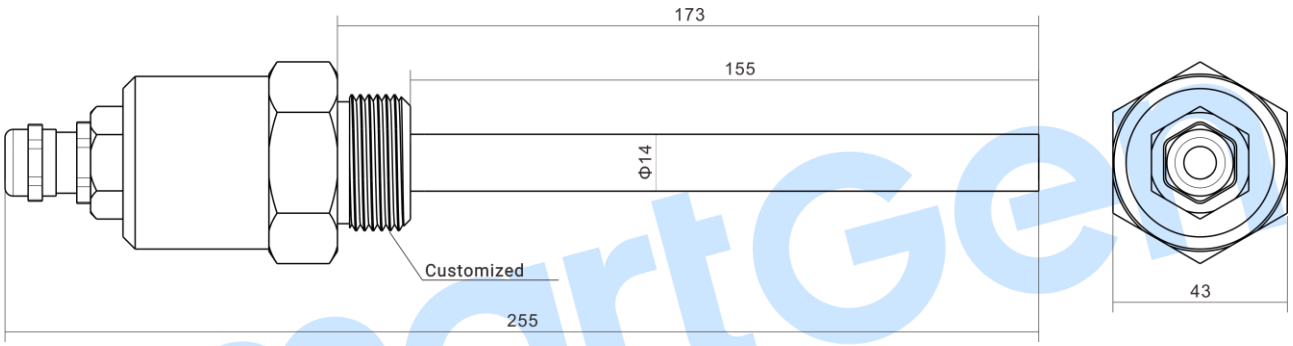

Fig.3 – HTL04A Case and Installation Dimensions