

# D.T3.5.1 JOINT REPORT ON CALIBRATION OF TRT DEVICES

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Annex A: Technical specification of the TRT  
devices of the project partners in  
comparison

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Version 1  
06 2019





GENERAL INFORMATION				
<b>Device name</b>	<b>TRT#1</b>	<b>TRT#2</b>	<b>TRT#3</b>	
manufacturer	UIT Dresden	Wärmepumpen & Elektrotechnik Frank Reimelt	UBeG GmbH & Co. KG	
year of manufacture	2009	2008	2015	
mobility of the device	Built on pallet, fixed on trailer, detachable	mobile box	transportable box (mounted on caterpillar)	
size of the device	1.5 m x 0.5 m x 1.5 m	0.85 m x 0.75 m x 0.65 m	1.0 m x 0.8 m x 0.6 m	
size of casing (L x W x H)	2 m x 1.5 m x 2.5 m	dto.	dto.	
device lockable	yes	yes	yes	
possible BHE types	1xU, 2xU, Concentric	1xU, 2xU, Concentric	1xU, 2xU, Concentric	
TECHNICAL INFORMATION				
<b>specifications heater / cooler</b>				
heat injection	yes	yes	yes	
heat extraction	no (prepared to connect a heat pump)	no	no	
type of heater / cooler	Schniewindt, CSN flow heater 97-AS	?	Conti-Electron, screw-in heater CEL 631-636	
power connection	3-phase, 400 V, 50 Hz	3-phase, 400 V, 50 Hz		
maximum power	10 kW	12 kW	9 kW	
regulation of heater	currently with electronic contactor, infinity variable but pulsed in part load (modification planned to fixed heat steps)	3 heat steps; first step variable	step less with PLC	
<b>specifications circulation pump</b>				
type of circulating pump	centrifugal pump Stübbe Typ SHB 20-100	glandless circulation pump Wilo TOP-S 25/7,5	Wilo Stratos 25/1-8	
power	550 W	90 / 125 / 195 W	9 - 125 W	
total dynamic head	15 m	7.5 m	8 m	
maximum flow rate	5 m³/h	8 m³/h	~ 8m³/h (theoretic) / ~ 2m³/h (reality)	



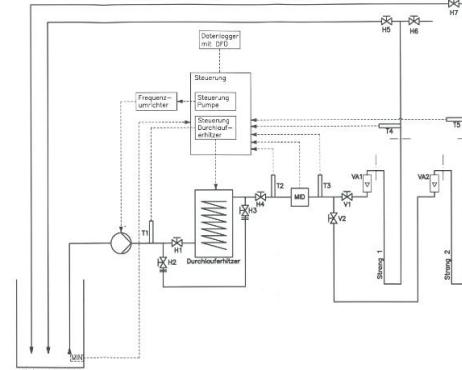
regulation of pump	frequency controlled, feedback loop with flow sensor	Speed-stage switching (3 steps)	yes
<b>specifications temperature sensor</b>			
type temperature sensor	E&H Easytemp TMR-31, PT 100, class A	PT1000, class B	Pt500 – EN 60 751
signal transmission	4-20 mA	2 conductors	4-20 mA
number of sensors	7	3	2
response time	< 1 s	2 s	2 s
total deviation of electronics and sensor (from datasheet)	0.25 K + 0.002 x  T	± 0.5 K	$E_c \pm (0.5 + \Delta \theta_{\min}/\Delta \theta)\%$
paired temperature sensors	yes	-	yes
last calibration date of sensors / maximum relative deviation between sensors	06.08.2013 / 0.02 K		23.01.2015 / 0.021 K
temperature range		-50 ... 150 °C	0 ... 180 °C
position of sensors	directly at BHE, in- and outlet before and after heater	in- and outlet before and after heater	before and after heater
<b>specifications flow meter</b>			
type of flowmeter	Siemens		Kamstrup Ultraflow 54
type of sensor	Sitrans F M MAG 5000 + MAGFLOW 5100 W	Sika, VTH 25 MS -180	ultrasound sensor
signal transmission	magnetic flow meter (MAG)	turbine flow sensor with Hall-effect detection	
accuracy (from data sheet)	4-20 mA & digital output	pulse output	
last calibration date / maximum deviation to reference	0.4 % ±1 mm/s	± 5 %	
flow regulation of double u-tubes	24.09.2010 / 0.13 %	mechanical valves	mechanical valves
	mechanical flow meters		



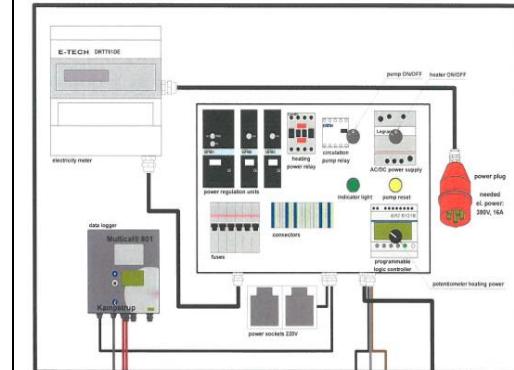
<b>specifications control system</b>			
type of control system	Siemens SPS - Simatic S7	no central control unit	Schneider SR2B121B
uninterrupted power supply - UPS	only for control circuit	no UPS	no
<b>datalogger</b>			
type of datalogger	UIT LogTrans16-GPRS	Greisinger EASYlog 40 KH Greisinger EASYlog 40IMP-T	Kamstrup Multical 801
central / decentral datalogger	1 common datalogger for all sensors	3 datalogger for temperature 1 datalogger for flow meter	1 datalogger for all sensors
resolution	16 bit	-	-
minimum sampling interval	10 s	2 s	
max. value storage	2048 MB / 2,000,000 records	48'000 records	
<b>additional information</b>			
general power connection	electricity, 3-phase, 16 A	electricity, 3-phase, 16 A	electricity, 3-phase, 16 A
hydraulic extension tank	50 liter	-	yes
remote data transmission	GPRS to HTTP/FTP server	no, but alert via SMS	
remote control	no	no	no
measurement devices for temperature profile	Geowatt NIMO-T HT temperature cable lot (max. 200 m)	vanESSEN Mirco Diver	



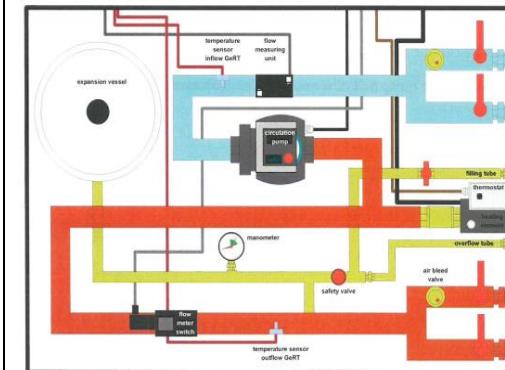
### principle layout



Not available



Schema of the switch unit



Schema of the hydraulic part of the GeRT-device