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Micro turbina produce in regim de cogenerare de inalta eficienta energie electrica (0,4 kV / 50 Hz) si energie termica sub forma de gaze arse, utilizand ca si combustibil gazele naturale.	The Microturbine produces in cogeneration system high-efficiency power (0.4/50 Hz) and heat from exhaust gas using natural gas as fuel.
In cazul gazelor naturale furnizate din retelele de distributie, este necesara montarea unui compresor in aval de micro turbina pentru a asigura presiunea minima necesara de 5,2 bar.	In the case of natural gas supplied from the distribution networks, it is necessary to mount a compressor downstream of the microturbine to ensure the minimum required pressure of 5.2 bar.
Instalatia de alimentare cu gaze naturale se compune dintr-un robinet de sectionare (cu sfera, sertar pana tija neascenta, sau fluture) # **8.01** care separa instalatia de alimentare cu gaz a micro turbinei, de coloana principala de alimentare a cazanelor existente in centrala termica.	Natural gas supply installation consists of o sectioning valve (with sphere, slide pinion valve, or butterfly) **# 8.01** which separates the gas supply installation of the microturbine, of the main supply column of the existing central heating boilers.
Ca element de siguranta in cazul depasirii anumitor parametrii din instalatiile din avalul micro turbine (HRU-schimbator de caldura gaze arse/apa), este montat un ventil electromagnetic # **8.17**, care este comandat de un PLC (Programmable Logic Controller).	As a safety feature in the case of exceeding certain parameters of installations downstream of the microturbine (SRH- exhaust gas heat exchanger/water), an electromagnetic valve is being mounted #8.17, which is controlled by a PLC (Programmable Logic Controller).
Gazele sunt filtrate prin filtrul # **8.06**,iar presiunea lor reglata de regulatorul cu dispozitiv de blocare la sub si suprapresiune # **8.00**. Contorizarea debitelor se face prin intermediul contorului cu turbina # **8.07** si a corectorului de volum PTZ # **8.08**.	The gases are filtered by filter **# 8.06**. and their pressure adjusted by the locking device regulator and overpressure device **# 8.00**. Flow metering is made via turbine meter **# 8.07** and of PTZ volume corrector **# 8.08**
Gazele naturale sunt astfel aspirate in compresorul de gaz # **8.09** la o presiune de intrare de 100 mbar pana la 110 mbar, si sunt refulate la o presiune de 5,2 bar.	Natural gas are thus vacuumed into the gas compressor **# 8.09** at a pressure of 100 mbar input up to 110 mbar, and are repressed at a pressure of 5.2 bar.
Ca element de siguranta in aval de compresor este montat un ventil de purjare # **8.19** pentru eliminarea suprapresiunilor ce pot aparea ca urmare a secventelor de oprire/pornire (pick shaving).	As a safety element downstream of the compressor is mounted a purge valve **# 8.19** to eliminate overpressures that may arise from sequences of stop / start (pick shaving)

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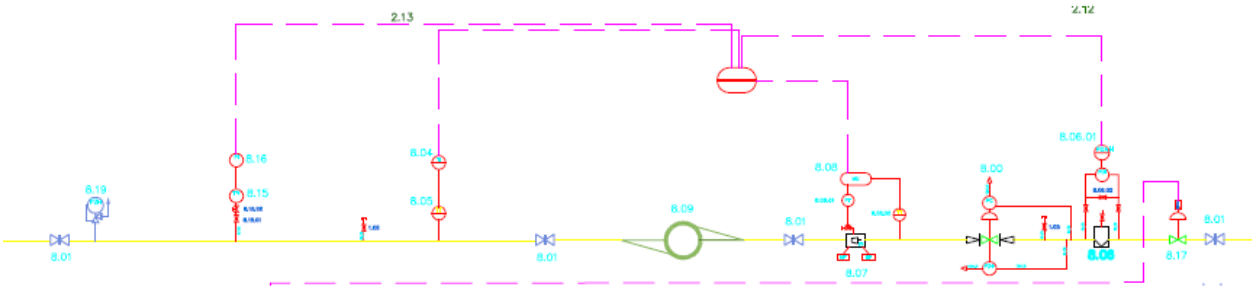

# 8.19	# 8.09	# 8.07 + # 8.08	# 8.00	# 8.06	# 8.17

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Gazele rezultate in urma procesului de combustie din micro turbina # **CHP-MT**, sunt evacuate prin intermediul tubulaturii de evacuare, a clapetei de sens # **1.01**, si prin intermediul by pass-ului dotat cu clapete future # **1.03** fie direct in aer pe cosul # **1.08** (in situatia in care se doreste producerea exclusive de energie electrica, in anumite secvente de oprire/pornire, si cand temperature si/sau presiunea din HRU-schimbatorul de caldura depaseste parametrii setati), fie trecute prin schimbatorul de caldura # **1.04** cedand astfel caldura apei ce, circula prin acesta. Temperatura gazelor arse la iesirea din micro turbina este de cca.290 grade Celsius. Temperatura apei pentru tur/retur, in schimbatorul de caldura este de 90/70 grade Celsius.	The gases resulting from the combustion of the microturbine #**CHP-MT**, are discharged through the exhaust duct, damper sense **# 1.01**, and through the by-pass equipped with butterfly valve **#1.03** to be directly in the air on the chimney # **1.08** (in the case that is desired the exclusive production of electricity, in certain sequences of stop/start, and when temperature and /or the pressure of the SRH heat exchangers exceed the set parameteres), to be passed through the heat exchanger **#1.04** thus ceding the heat of the water flowing through it. The water's temperature for flow/return, in the heat exchanger is 90/70 degrees Celsius.
Pentru preluarea dilatarilor din circuitul apei, pe returul instalatiei este montat un vas de expansiune # **2.03**. in situatia in care presiunea din instalatie depaseste limitele normal admise (max 6 bar),	For taking over the expansions of the water flow, on the return of the installation it is mounted an expansion vessel **#2.03** in the situation where the pressure from the installation exceeds the normally

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supapa de siguranta # **2.01** refuleaza vaporii/apa din instalatie. Cand presiunea din instalatie (HRU-schimbator de caldura si circuitul de apa calda tur/retur) depaseste presiunea la care este setata supapa de siguranta, traductorul de presiune / presostatul # **2.16** comanda electroventilul de siguranta # **8.17** si intrerupe alimentarea cu gaze naturale. Acest sistem este redundant celui deja existent in interiorul micro turbinei.

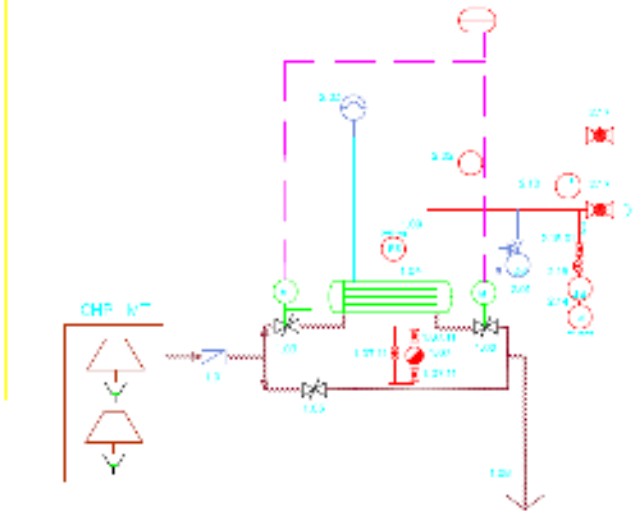
Condensatul ce se acumuleaza in interiorul HRU-schimbatorul de caldura # **1.04**, este eliminat automat prin oala de condens # **1.07**.

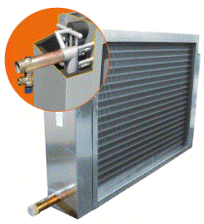
Debitul gazelor arse ce trec prin HRU-schimbatorul de caldura # **1.04**, poate fi reglat prin intermediul traductorului de temperatura # **2.02** si a **PLC-1** care comanda actuatorii by pass-ului # **1.03.** astfel putand fi mentinuta si temperatura de iesire din HRU-schimbator de caldura constanta la 90 grade Celsius. Presiunea apei din instalatie este monitorizata local prin intermediul manometrului # **2.14** si la distanta prin traductorul de presiune # **2.15**. temperatura este monitorizata local prin intermediul termometrului # **2.10** si la distanta prin traductorul de temperatura # **2.02**.

allowed limits (6 bar max) the safety valve **#2.01**, steam repression/water from the installation. When the pressure from the installation (SRH-heat exchanger and the hot water flow/return circuit) exceeds the pressure of which the safety valve is set, pressure transducer/pressure switch # **2.16** selenoid safety control valve #8.17 and interrupts the gas supply. This system is redundant within the already existing microturbine.

The condensate that accumulates inside the SHR heat exchanger **# 1.04**, is automatically eliminated through condensation chamber **# 1.07**.

Exhaust gas flow passing through the SHR heat exchanger **#1.04** can be adjusted through the temperature transducer **#2.02** and the **PLC-1** which controls the by-pass's actuators **#1.03** thus being able to maintain the constant exit temperatures from the SHR-heat exchanger of 90 degrees Ceslius. The pressure of the water in the installation is locally controlled through the manometer **#2.14** and remote pressure transducer **#2.15** the temperature is locally monitored through the thermometer **#2.10** and remotely through a temperature transducer **#2.02.**





# CHP-MT	**# 1.04**	**# 1.02 + # 1.03**	**# 2.03**	**# 2.01**	**# 1.07**	**# PLC-1**

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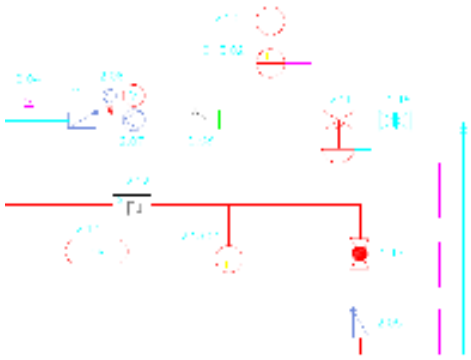
Energia termica este contorizata prin intermediul unui contor cu ultrasunete # **2.12** si a unui integrator # **2.13** ce primeste semnalele de pe tur/retur de la traductorii de temperatura # **2.13.01** si # **2.13.02**.	The thermal energy is metered through an ultrasonic meter **# 2.12** and of an integrator **# 2.13** receiving signals from the flow/return from the temperature transducers **# 2.13.01** and **#2.13.02**.
Pe returul instalatiei este montata pompa de recirculare a agentului termic # **2.07**, filtrul Y de impuritati # **2.08**, clapeta unisens # **2.05**, aeratorul automat # **2.04** si vasul de preluare a socurilor # **2.06 (**din secventele de pornire/oprire ale pompei, astfel eliminand scurtele cresteri de presiune in vaal de pompa si nedeclansand ventilul de purjare # **2.10** si senzorul de presiune/presostatul # **1.09**).	On the return of the installation there is mounted a heat recirculant pump **# 2.07**, Y impurities filter **# 2.08**, a return valve, **#2.05**, automatical aerator, **#2.04** shock acquisition vessel **# 2.06** (from the sequences of stop/start of the pump, thus eliminating the short pressure increasing downstream of the pump and not triggering the purge valve **# 2.10** and the pressure sensor/pressure switch.
Temperatura apei pe tur/retur este monitorizata de integrator (local si la distanta). Energia termica furnizata cat si parametrii de funizare, sunt memorati atat local cat si la distanta. Temperatura tur si retur este monitorizata de termometrele # **2.10.**	Flow/return water temperature is monitored by the integrator (locally and remotely). The thermal energy supplied and the supply parameters, are stored both locally and remotely. Inlet and outlet temperature is monitored by thermometers **# 2.10**.
Presiunea diferentiala intre tur/retur este reglata prin intermediul regulatorului de presiune si temperatura # **2.11** si a sondei acestuia **# 2.11.01**.	The differential pressure between the flow/return is adjusted through the pressure and temperature regulator **#2.11** and its probe **# 2.11.01**.



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# 2.06	# 2.05	# 2.07	# 2.13 + # 2.12	# 2.11	# 2.08

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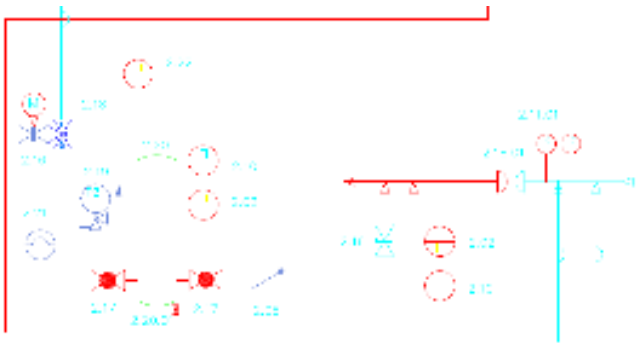
In perioadele de timp in care cererea de energie termica este mai redusa, pentru a reduce numarul de secvente start/stop ale micro turbine, (ce conduc la costuri de exploatare suplimentare), precum si pentru a uniformiza productia si furnizarea de agent termic, s-a prevazut un acumulator de apa calda (90 grade Celsius) # **2.20**, in care cand temperatura de pe returul instalatie depaseste valoarea de 71 grade Celsius, prin intermediul robinetului de amestec cu 3 cai # **2.16** si a elementului sau sensibil # **2.16.01** montat pe retur (plaja temperaturii de actionare poate fi setata de la acesta), se deviaza de pe turul instalatiei furnizarea agentului termic in distribuitor prin acumulatorul de apa. In momentul in care temperatura de pe returul instalatiei scade sub cea de 71 grade Celsius, robientul cu trei cai # **2.16** deviaza din nou direct catre distribuitor agentul termic. Pentru evitarea depasirii temperaturii maxim admise in acumulator, s-a montat in aval de robinetul cu 3 cai, un robinet cu actuator electric # **2.23** care in momentul atingerii pragului temperaturii maxim admise constructiv (90 grade Celsius) inchide traseul de admisie in acumulator, in amonte de robinetul cu 3 cai. Comanda de inchidere/deschidere este data robinetului cu actuator electric prin intermediul unui termostat # **2.22**. Daca temperatura in acumulator este de max 90 grade Celsius si temperatura returului este peste limita de 71 grade Celsius, agentul termic nefiind furnizat nici in distribuitor cat nici in acumulator, pompa de recirculatie se opreste, micro turbine oprindu-se si ea din functionare. Ca element de protectie al acumulatorului, s-au montat un vas de expansiune # **2.21** si un ventil de purjare # **2.19**. Temperatura din acumulator	In the periods of time when the demand of thermal energy is lower, for reducing the stop/start sequences of the microturbine, (which lead to additional operating costs), as well to smooth the production and supplyment of thermal agent, a hot water accumulator has been forseen (90 degrees Celsius) **#2.20** in which the temperature of the return of the installation exceeds the value of 71 degrees Celsius, through a 3-way mixing valve **# 2.16** and of the element or sensitive **# 2.16.01** mounted on the return (the range of the operating temperature ca be set of), it deviates from the flow of the installation, the supply of thermal agent in the distributor through the water accumulator. When the temperature of the return of the installation decreases under the 71 degrees Celsius, the 3-way mixing valve **# 2.16** deviates again to the thermal agent distributor. To avoid exceeding the maximum permissible temperature in the accumulator, the 3-way accumulator was mounted downstream, an electric actuator accumulator **#2.23** which when reaching the maximum allowed constructive temperature (90 degrees Celsius) shuts the inlet route in the accumulator, upstream the 3-way valve. The order of opening / closing valve actuator is given by a thermostat **# 2.22.** If the temperature in the acumulator is of 90 degrees Celsius max. And the return temperature is over the limit of 71 degrees Celsius, the thermal agent not being supplied by any distributors and no accumulators, the recirculation pump stops, and the microturbine stops working. As a safety element of the accumulator, an expansion vessel has been mounted **#2.21** and a

este monitorizata local prin intermediul unui termometru # **2.10** si de la distanta prin intermediul unui traductor de temperatura # 2.02.	purge valve # **2.19**. The temperature from the accumulator is monitored locally by a thermometer # **2.10** and remotely through a temperature transducer **#2.02**



# 2.20	# 2.16	# 2.23	# 2.22	# 2.02	# 2.19	# 2.21

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De pe distribuitor se preia prin intermediul unui racord, agent termic (90 grade Celsius) care este trecut printr-un schimbator de caldura in placi # **3.14**. pe intrarea in schimbatorul de caldura se furnizeaza apa rece din reteaua de distributie a, orasului. In acest mod se prepara apa calda menajera necesara spitalului. Pentru a nu depasii temperature maxim admisa in instalatie, pe tur se monteaza un robinet cu actuator electric # **3.15** care in momentul atingerii pragului temperaturii maxim admise constructiv (90 grade Celsius) inchide traseul de admisie in schimbatorul de caldura, in amonte de acesta. Comanda de inchidere/deschidere este data robinetului cu actuator electric prin intermediul unui termostat #	From the distributor, it's being taken through a connection, thermal agent (90 degrees Celsius) which is passed through a plated heat exchanger **#3.14**. on the entry of the heat exchanger cold water from the town's distribution network is being supplied. This way the required domestic hot water for the hospital is being prepared. Not to overcome the maximum temperature in the system, on flow, an electric actuator accumulator is being mounted **#3.15** which on reaching the maximum temperature allowed by construction (90 degrees Celsius) it shots the inlet route in the heat exchanger, upstream of it. The order of opening / closing valve is given to the actuator by

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3.18. Temperatura apei calde menajere este supravegheata local prin intermediul unui termometru # **3.12** si la distant prin intermediul unui traductor de temperature # **3.13**. Pentru a putea asigura in mod constant apa calda menajera chiar si in orele de varf de consum, s-a montat un acumulator de apa calda cu serpentine interioara # **3.11**. Acesta nu doar foloseste ca si vas tampon ci, in cazul in care concomitent creste consumul de apa calda menajera si agent termic ptr incalzire, atunci de la cele doua cazane existente (Baltur), se preia agent termic ce prin intermediul serpentinei din interiorul vasului tampon # **3.11** se ridica temperature apei, pana la cea preconizata (in plaja 40 - 55 grade Celsius). Admisia agentului termic de la cele doua cazane, in serpentina interioara a, acumulatorului se face prin intermediul unui robinet de deviatie cu 3 cai # **3.08.** In cazul in care temperature din interiorul vasului depaseste pe cea maxim admisa, un thermostat # **3.16** comanda inchiderea robinetului cu actuator electric # **3.15** montat pe turl celor doua cazane (Baltur). Pentru situatiile in care presiunea din interiorului vasului tampon o depaseste pe cea constructiva, s-a monta un ventil de purjare # **3.18**	a thermostat # **3.18.** The hot water temperature is monitored locally through a thermometer # **3.12** and remotelly through a temperature transducer **#3.13**. To constantly ensure domestic hot water even during peak hours, a hot water accumulator with coils inside has been mounted **# 3.11** This does not use as a buffer tank but, in the case that the domestic hot water and thermal agent for heating increases at the same time, then from the two existing boiler (Baltur), it takes thermal agent through the coil inside the buffer tank **#3.11** water temperature arises, until the forseen one (in range of 40-55 degrees Celsius). The inlet of thermal agent to both boilers, in the inside coil of, the accumulator is being made through a 3-way deviation accumulator **#3.08**. In the case the temperature inside the vessel exceeds the maximum admitted one, a thermostat **#3.16** the order of closing the electric actuator accumulator **# 3.15** mounted on the tower of the two boilers (Baltur) For the situations where the pressure inside the buffer tank exceeds the constructive one, a purge valve has been mounted **#3.18**

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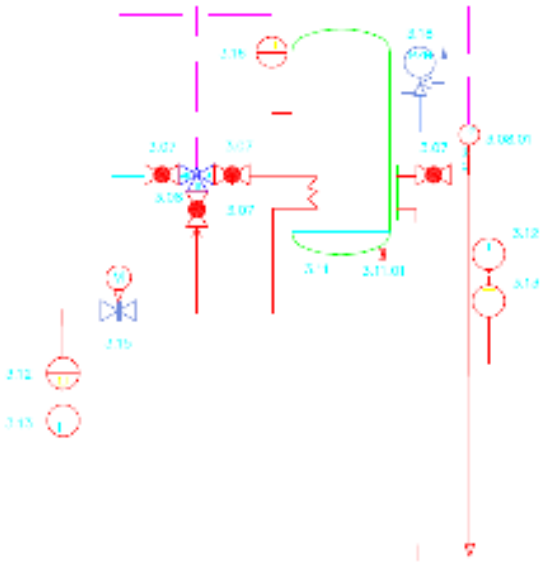

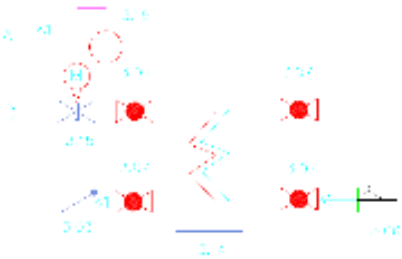

# 3.11	# 3.08	# 3.15	# 3.16	# 3.18	# 3.12	# 3.14

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