THE OPERATION MANUAL OF
BCJAD X(F), S X(F) TYPE HEAT EXCHANGER

1. APPLICATION

Heat exchangers type BCJAD X(F), S X(F) are used in pump central heating installation and preparation of usable hot water supplied with heat energy from high water parameter or steam. Heat exchangers may also be used in ventilating, technological and air conditioning installations. Water and glycol are provided as working medium.

Due to used material, heat exchangers are especially useful in case of heating, (cooling) of corrosive aggressive water including free oxygen, aggressive carbon dioxide, chlorines and sulfate ions of concentration up to 150 mg/dm^3. Treated water should be used in closed systems and water treating devices, e.g. magnetizer in open systems.

2. DESIGN

BCJAD X (F), S X(F) heat exchangers are counter current flow heat exchangers. Heat exchanger area consists of helicoidally, coaxial coils made of coiled backward tubes of dia 12x0,6 mm, 10x0,6 mm and ϕ 8×0,6 mm. Tube bundle is ended with two tube-sheets located in head's nozzles. Remaining two nozzles serve to connect installation with shell side. In case of tube leakage, it may be fixed by plugging this tube both sides. Plugging of 5% number of pipes is permitted. Heat exchangers are not dismountable welded design and are made of stainless steel.

3. DESIGNATION

BCJAD X F 5.38.08.71.FF

- FF - designation of max. operation conditions
- 71 - designation of shell length [cm] for heat exchanger in short version, lack of number means that shell has standard dimensions
- 08 - designation of tube diameter [mm], lack of number means that tube diameter is 8 [mm]
- 5.38 - designation of heat exchanger size
- F - F letter means that tube bundle is manufactured o f corrugated tube, lack of F letter means, that coil tube is manufactured of smooth tube
- BCJAD X - type of heat exchanger

4. ASSEMBLY

Before installation, inspect, external and internal surfaces of the heat exchanger in order to check whether or not created any damage during transport and storage. Heat exchangers should be assembled in vertical position enabling operation and service and making impossible vibration and stresses transferred from installation to heat exchanger ferrules. For assembly, it is advised to use nuts class 5.6 and gaskets Gambit AF-300 3mm thick.

Prior to heat exchanger it is necessary to install filters. Heat exchanger should be protected against increase of pressure exceeding permissible one by means of pressure expansion vessel and safety valve. Momentary pressure increase in the response time of the protective device used can not be greater than 10%.

During installation, ensure a sufficient degree of purity of connected elements. Assembly work shall be carried out at a temperature above 0 ° C by persons qualified to perform the work.

5. OPERATION CONDITIONS

Initial startup:

Before starting the approach with a heat exchanger, check the completeness and condition of the heat exchanger, the connection of electrical control and measurement equipment and proper grounding. When you turn on the heat exchanger must be avoided shocks or impacts thrust fluids. Vibration and shock wave pressure pumps or similar endowments can not be transferred to a heat exchanger.

Operation:

In order to guarantee proper operation of heat exchangers the following rules should be obeyed:

1. It is not allowed to exceed permissible pressure and temperature.
2. Not to allow for freezing of working medium on both sides of the heat exchanger.
3. Not to allow for rapid changes of medium temperature. First cold fluid circulation should be put into operation where the temperature raise should not exceed 10°C/min and pressure raise should not exceed 3 bar/min
4. Not to allow for excessive fouling of heat exchangers.
5. Perform periodical cleaning of heat exchangers according to below mentioned recommendations:
   - Heat exchangers operating in central heating system – at least every 18 months;
   - Heat exchangers operating in usable hot water preparation, at least every 12 months.
   - Frequencies of cleaning can increase when poor working conditions occur. The manufacturer does not bare the costs of cleaning.

Cleaning should be performed by pumping cleaning liquid through the heat exchanger with a stream of min. 1,5 times bigger than the normal operating stream. When choosing a cleaning fluid, it is advised to be aware of the kind of build up in the heat exchanger. Most frequent build ups with water applications are boiler scale $CaCO_3$, iron trioxide Fe_2O_3. Leaving one build up while removing the other can result in the corrosion of the heat exchanger. Manual cleaning of heat exchangers will be sent to the user's request. Please take care of cleanliness within the heat exchanger, particularly for maintenance such as immediately remove the spilled fluid.

Stop:

Retention should happen slowly, and both fluids must also stop. If this is not possible then you should first stop the flow of hot fluid. If the heat exchanger is excluded from moving for a long time, it has to be emptied, especially if the fluid in the heat exchanger may freeze, or the medium is corrosive.

Standard Checks:

• Control of measuring instrument

• control of pipeline leak

• Maintenance of external surfaces when the device is in an environment with a high content of dust.

• In good condition should be developed to maintain cooling control and measurement apparatus and eliminate the possibility of ignition of dust

Malfunction or damage to the pressure may be manifested by leakage or pressure drop.

6. MARKING

Heat exchangers are equipped with name plate including the basic information.

7. TECHNICAL DATA

Type of heat exchanger	Max. operation pressure [MPa]		Max. operation temp. [°C]	HE category acc. to PED/97/23	Volume [dm^3]		Heat Transfer Area [m^2]	Max. water flow rate [m^3/h]*	
	shell	tubes			shell	tubes		shell	tubes
BCJAD X (F) 2.11.08.68.FF	1,6	1,6	203	SEP	1,2	1,2	0,6	8,0 (5,1)	2,8 (2,0)
BCJAD X (F) 2.11.FF	1,6	1,6	203	SEP	2,6	2,3	1,2	6,8 (4,2)	2,5 (1,6)
BCJAD X (F) 3.18.08.75.FF	1,6	1,6	203	SEP	2,5	2,6	1,2	12,5 (12,5)	3,4 (2,8)
BCJAD X (F) 3.18.FF	1,6	1,6	203	I	5,0	4,0	2,0	10,5 (10,5)	4,5 (2,5)
BCJAD X (F) 5.38.08.71.FF	1,6	1,6	203	I	6,8	4,0	2,3	29,5 (29,0)	10 (8,5)
BCJAD X (F) 5.38.FF	1,6	1,6	203	I	11,2	6,6	4,0	19,0 (15,5)	7,0 (6,0)
BCJAD X (F) 6.50.08.72.FF	1,6	1,6	203	I	9,9	4,6	3,1	(31,0)	(11,0)
BCJAD X (F) 6.50.FF	1,6	1,6	203	II	13,6	11,2	5,3	25,0 (18,0)	13,5 (7,5)
BCJAD X (F) 6.50.10.FF	1,6	1,6	203	II	10,6	14,2	5,1	34,0 (25,0)	19,0 (11,0)
BCJAD X (F) 9.88.08.65.FF	1,6	1,6	203	II	20,8	6,6	5,0	(76,0)	(21,0)
BCJAD X (F) 9.88.08.85.FF	1,6	1,6	203	II	25,0	8,2	6,2	(76,0)	(18,5)
BCJAD X (F) 9.88.FF	1,6	1,6	203	II	29,0	16,0	10,7	54,0 (45,0)	20,0 (13,0)
BCJAD X (F) 9.88.10.FF	1,6	1,6	203	II	32,0	13,0	8,3	76,0 (72,0)	27,0 (17,5)
BCJAD X (F) 9.88.12.FF	1,6	1,6	203	II	30,0	16,0	6,1	76,0 (72,0)	(25,0)
BCJAD X (F) 12.114.08.50.FF	1,6	1,6	203	II	29,0	8,0	6,3	(82,0)	(39,0)
BCJAD X (F) 12.114.08.60.FF	1,6	1,6	203	II	34,0	8,0	6,5	(82,0)	(39,0)
BCJAD X (F) 12.114.08.75.FF	1,6	1,6	203	II	38,5	10,0	8,8	(82,0)	(23,0)
BCJAD X (F) 12.114.FF	1,6	1,6	203	II	54,2	20,1	18,4	64,0 (62,0)	21,0 (13,5)
BCJAD X (F) 12.114.10.FF	1,6	1,6	203	II	55,0	19,3	14,9	62,0 (62,0)	21,0 (13,5)
BCJAD X (F) 12.114.12.FF	1,6	1,6	203	II	55,8	18,5	10,5	(62,0)	(25,5)
S0 X (F).FF	1,6	1,6	203	I	6,2	3,3	2,3	20 (16)	4 (3, 5)
S1 X (F).FF	1,6	1,6	203	I	9,8	4,5	3,1	26 (24)	5 (4, 2)

* sizes for heat exchangers are given in brackets with F designation (corrugated tubes)

SEP – Sound Engineering Practice

8. PACKING, STORAGE AND TRANSPORT

Heat exchangers do not require packing. They should be stored in open place protecting them against weather conditions and corrosive agents. Heat exchangers should be protected against possibility of damage and fouling during transport and storage.

9. DRAWING OF HEAT EXCHANGER AND BASIC DIMENSIONS

9.1. Dimensions of heat exchangers

9.1.1 17-12-2,5 Material (1.4404)

Type of heat exchanger	A [mm]	B [mm]	C [mm]	D [mm]	ØDz [mm]	Gd[3] [mm]	Gd_o[4] [mm]	Gp[3] [mm]	Gp_o[4] [mm]	F1 F2 F3 F4[1]	F5
BCJAD X (F) 2.11.08.68.FF	160	835	942	251	80	1,5	0,89	1,5	0,73	1 ½"gz DN40kp	G1"
BCJAD X (F) 2.11.FF	160	1513	1620	251	80	1,5	0,89	1,5	0,73	1 ½"gz DN40kp	G1"
BCJAD X (F) 3.18.08.75.FF	172	917	1037	272	101,6	1,5	0,98	1,5	0,88	2"gz DN50 kp	G1"
BCJAD X (F) 3.18.FF	172	1510	1630	272	101,6	1,5	0,98	1,5	0,88	2"gz DN50 kp	G1"
BCJAD X (F) 5.38.08.71.FF	204	908	1044	314	139,7	2,0	1,40	2,0	1,1	DN65kp	G1 ½ "
BCJAD X (F) 5.38.FF	204	1510	1646	314	139,7	2,0	1,40	2,0	1,1	DN65kp	G1 ½ "
BCJAD X (F) 6.50.08.72.FF	206	907	1068	314	159	2,0	1,55	2,0	1,28	DN80kp	G2"
BCJAD X (F) 6.50.FF	206	1492	1653	314	159	2,0	1,55	2,0	1,28	DN80kp	G2"
BCJAD X (F) 6.50.10.FF	206	1492	1653	314	159	2,0	1,55	2,0	1,28	DN80kp	G2"
BCJAD X (F) 9.88.08.65.FF	253	886	1050	416	219,1	2,6	2,33	2,0	1,69	DN100kp	G2"
BCJAD X (F) 9.88.08.85.FF	253	1086	1250	416	219,1	2,6	2,33	2,0	1,69	DN100kp	G2"
BCJAD X (F) 9.88.FF	253	1481	1676	416	219,1	2,6	2,33	2,0	1,69	DN100kp	G2"
BCJAD X (F) 9.88.10.FF	253	1481	1676	416	219,1	2,6	2,33	2,0	1,69	DN100kp	G2"
BCJAD X (F) 12.114.08.50.FF	340	871	935	501	273	2,6	2,36	2,6	2,12	DN100kp	G2"
BCJAD X (F) 12.114.08.60.FF	340	881	1053	501	273	2,6	2,36	2,6	2,12	DN100kp	G2"
BCJAD X (F) 12.114.08.75.FF	340	1031	1203	501	273	2,6	2,36	2,6	2,12	DN100kp	G2"
BCJAD X (F) 12.114.FF	340	1681	1910	501	273	2,6	2,36	2,6	2,12	DN100kp	G2"
BCJAD X (F) 12.114.10.FF	340	1681	1910	501	273	2,6	2,36	2,6	2,12	DN100kp	G2"
BCJAD X (F) 12.114.FF**	340	1678	1897	484	273	2,6	2,36	2,6	2,12	DN125kp	G2"
S0 X (F).FF	204	911	1026	300	139,7	2,0	1,40	2,0	1,34	1 ½"gz DN40kp	
S1 X (F).FF	206	993	1108	302	159	2,0	1,46	2,0	1,47	1 ½"gz DN40kp	

[1] gz – external thread (male) kp – Flat flange,
[2] not standard version of heat exchanger,
[3] Gd- thickness of hemispherical head, Gp – thickness of shell
[4] Gd_o - computational thickness of hemispherical head, Gp_o – computational thickness of shell

In the drawing 100° angle between the connecting pieces, for BCJAD X(F) 12.114 has a value 110 °.

ØDz tubes [mm]	Thickness of tubes [mm]	Computional thickness of tubes [mm]
8	0,6	0,25
10	0,6	0,26

9.1.2 18-10 Material (1.4307)

Type of heat exchanger	A [mm]	B [mm]	C [mm]	D [mm]	ØDz [mm]	Gd[3] [mm]	Gd_o[4] [mm]	Gp[3] [mm]	Gp_o[4] [mm]	F1 F2 F3 F4[1]	F5
BCJAD X (F) 2.11.08.68.FF	160	835	942	251	80	1,5	0,98	1,5	0,8	1 ½"gz DN40kp	G1"
BCJAD X (F) 2.11.FF	160	1513	1620	251	80	1,5	0,98	1,5	0,8	1 ½"gz DN40kp	G1"
BCJAD X (F) 3.18.08.75.FF	172	917	1037	272	101,6	1,5	1,05	1,5	0,98	2"gz DN50 kp	G1"
BCJAD X (F) 3.18.FF	172	1510	1630	272	101,6	1,5	1,05	1,5	0,98	2"gz DN50 kp	G1"
BCJAD X (F) 5.38.08.71.FF	204	908	1044	314	139,7	2,0	1,53	2,0	1,3	DN65kp	G1 ½ "
BCJAD X (F) 5.38.FF	204	1510	1646	314	139,7	2,0	1,53	2,0	1,3	DN65kp	G1 ½ "
BCJAD X (F) 6.50.08.72.FF	206	907	1068	314	159	2,0	1,53	2,0	1,42	DN80kp	G2"
BCJAD X (F) 6.50.FF	206	1492	1653	314	159	2,0	1,70	2,0	1,42	DN80kp	G2"
BCJAD X (F) 6.50.10.FF	206	1492	1653	314	159	2,0	1,70	2,0	1,42	DN80kp	G2"
BCJAD X (F) 9.88.08.65.FF	253	886	1050	416	219,1	3,0	2,59	2,0	1,90	DN100kp	G2"
BCJAD X (F) 9.88.08.85.FF	253	1086	1250	416	219,1	3,0	2,59	2,0	1,90	DN100kp	G2"
BCJAD X (F) 9.88.FF	253	1481	1676	416	219,1	3,0	2,59	2,0	1,90	DN100kp	G2"
BCJAD X (F) 9.88.10.FF	253	1481	1676	416	219,1	3,0	2,59	2,0	1,90	DN100kp	G2"
BCJAD X (F) 12.114.08.50.FF	340	871	935	501	273	3,0	2,59	2,6	2,38	DN100kp	G2"
BCJAD X (F) 12.114.08.60.FF	340	881	1053	501	273	3,0	2,59	2,6	2,38	DN100kp	G2"
BCJAD X (F) 12.114.08.75.FF	340	1031	1203	501	273	3,0	2,62	2,6	2,38	DN100kp	G2"
BCJAD X (F) 12.114.FF	340	1681	1910	501	273	3,0	2,62	2,6	2,38	DN100kp	G2"
BCJAD X (F) 12.114.10.FF	340	1681	1910	501	273	3,0	2,62	2,6	2,38	DN100kp	G2"
BCJAD X (F) 12.114.FF**	340	1678	1897	484	273	3,0	2,62	2,6	2,38	DN125kp	G2"
S0 X (F).FF	204	911	1026	300	139,7	2,0	1,60	2,0	1,47	1 ½"gz DN40kp	-
S1 X (F).FF	206	993	1108	302	159	2,0	1,62	2,0	1,62	1 ½"gz DN40kp	-

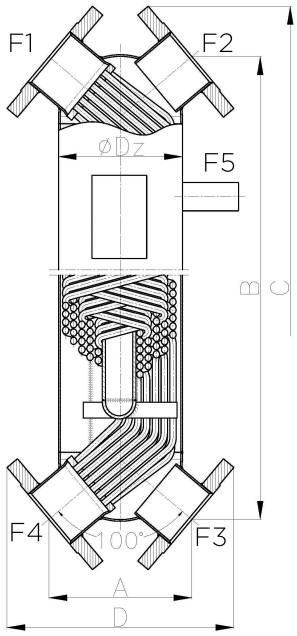
[1] gz – external thread (male) kp – Flat flange,
[2] not standard version of heat exchanger,
[3] Gd- thickness of hemispherical head, Gp – thickness of shell
[4] Gd_o - computational thickness of hemispherical head, Gp_o – computational thickness of shell

In the drawing 100° angle between the connecting pieces, for BCJAD X(F) 12.114 has a value 110°.

ØDz tubes [mm]	Thickness of tubes [mm]	Computional thickness of tubes [mm]
8	0,6	0,25
10	0,6	0,27

9.2. Standard of Connection Location (in counter current**):**

F1 – inlet hot side,
F2 – outlet cold side,
F3 – inlet cold side,
F4 – outlet hot side,
F5 – circulation nozzle (option),



9.3. Materials:

Heat transfer area:	1.4307, 1.4404, 1.4571, 1.4541
Thread connection:	1.4307, 1.4404, 1.4571, 1.4541
Flange connection:	1.4307, 1.4404, 1.4571, 1.4541, 1.0452, 1.0038

10. ACCESSORIES

10.1. Fixing brackets

BCJAD X(F), S X(F) heat exchanger may be supplied together with two brackets, due to which assembly is easy and it enables to fix it to wall or support frame. Assembly bracket set is supplied together with two clamping rings and nuts.

10.2. Thermal insulation

Insulation for heat exchangers type BCJAD X(F), S X(F) is easy to assembly and dismantle. Insulation supplied in two parts is assembled by means of clamping rings. It ensures decrease of heat losses and it does not cause useless heating of space in which heat exchanger is installed. Max. operation temperature is up to 135^0 C. Insulation is made of polyurethane foam.

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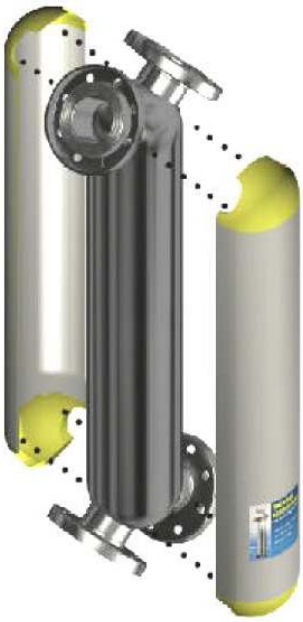

11.3. Connectors

Connectors simplify installation exchangers BCJAD X (F) SX (F) to be installed. Example exchanger assembly with connectors presented in figure.

Note: Accessories are not supplied in standard version with heat exchangers. They can be ordered separately

In matters not covered in the above manuals, please contact the technical department of the manufacturer.