Operation and maintenance
manual for

ONE-WAY
KNIFE
GATE VALVES
WITH DRIVE ACTUATOR

P/N
2904

Approved for use by

President of Factory, JAFAR S.A.

Failure to comply with the guidelines and instructions in this Operation and Maintenance Manual releases the manufacturer from all obligations, liability and guarantee.

Due to continuous business development, we reserve the right to introduce modifications and structural changes to the presented product.

CONTENTS

1 TECHNICAL DESCRIPTION

1.1 PRODUCT DESIGNATION AND IDENTIFICATION

The subject of this Operation and Maintenance Manual is**:**
Type 2904 one-way flange-to-flange knife gate valve with drive actuator

- full bore design
- stainless steel knife (closer)
- available with rising or stationary spindle
- soft gland seal of the closer and the body

1.2 USE

The Type 2904 one-way flange-to-flange knife gate valves are intended for water supply systems, and especially sewage systems, and industrial processing systems. The valves can be operated both in underground (non-flooded sewers) and overground installations as installed in vertical or horizontal pipelines.

1.3 TECHNICAL SPECIFICATION

The Type 2904 flange-to-flange knife gate valves are intended for transfer of potable water, process water and sewage, as well as other liquids as approved by the manufacturer.

- Temperature: 0°C to +70°C
- Nominal diameter (dimension) range: DN50 to DN700 [mm]
- Maximum medium flow rate: - liquid: max. 4 [m/s]
  - gas: max. 30 [m/s]

- The driving torque at opening start and closing end is as listed below:

DN [mm]	50	65	80	100	125	150	200	250	300	350	400	450	500	600	700
Mmax [Nm]	20	25	30	30	50	60	70	80	90	105	120	160	180	210	250

Valve control mode: the standard version of gate valve has the
clockwise closing sense of rotation.
The closing sense of rotation can be opposite on special order.

- The knife valves are designed for installation between flange end faces
  acc. to PN-EN 1092-2: 1999 with bolt holes for the pressure rating of PN10.

Installation length: per the technical file, see Table 2 for sizes.

- Nominal pressure PN values: - per size:

DN50 to DN250	- 1 MPa
DN300 to DN450	- 0.7 MPa
DN500 to DN600	- 0.4 MPa
DN700	- 0.25 MPa

2 DESIGN

2.1 DESCRIPTION OF THE VALVE DESIGN

The Type 2904 one-way flange-to-flange knife gate valves supplied by **F.A. „JAFAR"S.A.** feature a full bore body, a stationary spindle (in the standard version) and an L-gasket closure seal embedded in a metal enclosure. The body seal of the knife is a multi-layered packing compressed by a gland with bolts. The gland on the delivered valve is loose and must be tightened before installation. The knife gate valve body is a monolithic

panel design. The valve knife clears the body driven by the electric actuator (available from DN50) which drives the nut-seated threaded spindle from the outside. The one-way design means that the flow may only be admitted from one direction only to keep the valve leak-tight. The holes for flange-to-flange connection are tapped in the top valve body section and through in the bottom valve body section (see the bolt table). Table 4 shows the bolt sizing for flange ends (PN10 bolt hole layout).

2.2 MATERIALS

Table 1 lists the structural materials of the Type 2904 flange-to-flange knife gate valves.

Item	Part designation	Material	Reference standard
1	Body	Grey cast-iron, EN-GJL-250 Spheroidal cast-iron, EN-GJS-400-15 Steel grade 1.4301	PN-EN 1561: 2012 PN-EN 1563: 2012 PN-EN 10088-1: 2014
2	Seal	Package: Asbestos-free sealant + NBR	Manufacturer's catalogue PN-EN 1629: 2005
3	Knife	Steel grade 1.4301	PN-EN 10088-1: 2014
4	Spindle	Steel grade 1.4021	PN-EN 10088-1:2014
5	Stem	Steel grade 1.0038	PN-EN 10025-2:2007
6	Drive coupling	Cast-iron, EN-GJS-400-15	PN-EN 1563: 2012
7	Bolt	Stainless steel, A2	PN-EN ISO 4014: 2011
8	Safety ring	Steel grade 1.4301	PN-EN 10088-1:2014
9	Cap	Polypropylene	PN-EN ISO 1873: 2000
10	Shielding tube	Steel, R45	PN-89/H-84023.07
11	Pressure plate	Silumin, AlSi	PN-EN 1706: 2011
12, 13	Gasket	Rubber NBR	PN-EN 1629: 2005
14	Electric drive actuator		Manufacturer's catalogue

2.3 DIMENSIONS

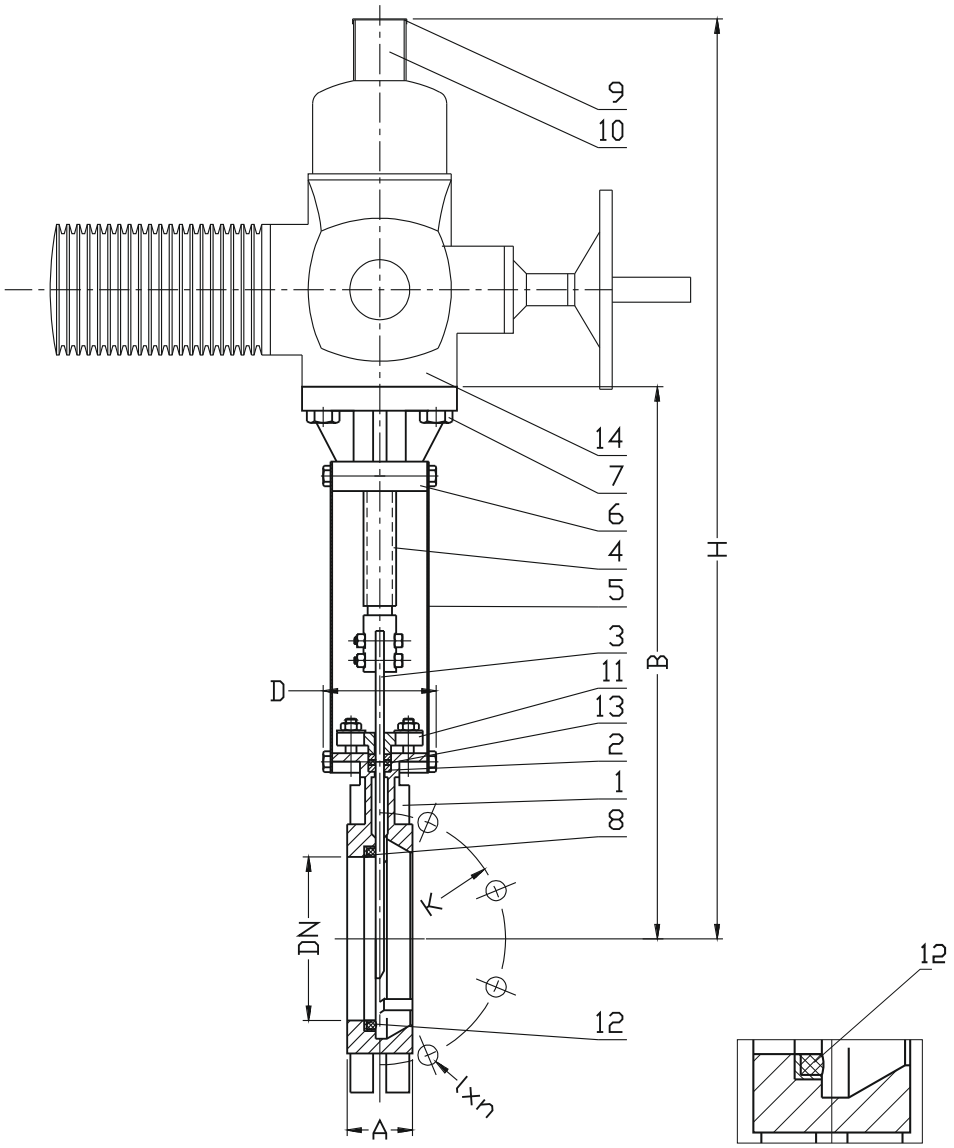


Table 2

DN	PN	PS	drive type	Flange	Thread type	No. of turns	K	l x n	A	B	D	H	Mass
[mm]	[bar]				[mm]	[n]	[mm]						[kg]
50	10 16	10	SA 07.2 (F7)	F7	Tr 20x4 LH	14	125	19x4	40	283	83	556	27
65						17	145			308		581	29
80						21	160	19x8	50	333		606	30
100						26	180			378		651	31
125			SA 07.6 (F7 / F10)	F7 / F10		32	210			423	93	696	37
150						39	240	23x8	60	474		747	41
200	10	7		F10	Tr 25x5 LH	41	295			593	108	866	58
250						51	350	23x12	70	685		958	72
300			SA 10.2 (F10)			61	400			792		1118	86
350					Tr 35x6 LH	59	460	23x16	96	900	290	1282	138
400						68	515	28x16	100	978		1441	168
450			SA 14.2 (F14)	F14		76	565	28x20	106	1105		1587	234
500		4				84	620	28x20	110	1215		1809	269
600						102	725	31x20		1418		2060	313
700		2	SA 14.6		Tr 50x8 LH	103	840	31x24		1640	400	2372	480

2.4 REFERENCE STANDARDS

PN-EN 1074-1: 2002	Valves for water supply. Fitness for purpose requirements and appropriate verification tests. General requirements
PN-EN 1074-2: 2002	Valves for water supply. Fitness for purpose requirements and appropriate verification tests. Isolating valves.
PN-89/H-02650	Valves and pipelines. Pressure and temperature ratings.
PN-EN 1092-2: 1999	Flanges and their joints. Circular flanges for pipes, valves, fittings and accessories, PN designated. Cast iron flanges.
PN-EN19: 2005	Industrial valves. Marking of metallic valves
PN-EN 12266-1: 2012	Industrial valves. Testing of metallic valves. Pressure tests, test procedures and acceptance criteria. Mandatory requirements.
PN-EN ISO 5210: 2011	Industrial valves. Multi-turn valve actuator attachments.
PN-EN ISO 6708: 1998	Pipework components. Definition and selection of DN (nominal size).
PN-EN 1559-1: 2011	Founding. Technical conditions of delivery. General.
PN-EN 1561: 2012	Founding. Grey cast irons.
PN-EN 1563: 2012	Founding. Spheroidal graphite cast irons.
PN-EN 1370: 2012	Founding. Surface roughness inspection by visual tactile comparators.
PN-EN 10088-1: 2014	Stainless steels. List of stainless steels.
PN-89/H-84023.05	Specific application steel. Improved quality low-carbon, low-alloy and alloy steels. Grades.
PN-EN 10025-2:2007	Hot-rolled products of structural steel grades – Part 2: Technical condictions for supply of non-alloy structural steel.
PN-EN 1982: 2010	Copper and copper alloys. Ingots and castings.
PN-EN 12420: 2002	Copper and copper alloys. Forgings.
PN-EN 1706: 2011	Aluminium and aluminium alloys. Castings. Chemical composition and mechanical properties.
PN-ISO 965-1: 2001	General purpose ISO metric threads. Tolerances. Principles and basic data.
PN-ISO 2903: 1996	Trapezoid ISO metric threads. Tolerances.
PN-EN ISO 4017: 2011	Hexagon head screws. Product grades A and B.
PN-EN ISO 4027: 2006	Hexagon socket set screws with cone point.
PN-ISO 1629: 2005	Rubbers and latices. Nomenclature.
PN-EN ISO 1873-1: 2000	Plastics. Polypropylene (PP) moulding and extrusion materials. Designation system and basis for specifications.
PN-EN ISO 12944-5: 2009	Paints and varnishes. Corrosion protection of steel structures by protective paint systems. Protective painting systems.

2.5 ORDERING INFORMATION

Water supply system valves are specific purpose industrial valves, therefore orders must include:

- part number (P/N, equal to the product type);
- intended use, e.g. for water supply systems,

and:

- nominal diameter, acc. to PN-EN ISO 6708: 1998
- nominal pressure, acc. to PN-89/H-02650;
- type of body material — acc. to PN-EN 1561: 2012, PN-EN 1563: 2012 or PN-EN 10088-1: 2014
- maximum operating temperature, acc. to PN-89/H-02650.

2.6 PRODUCTION AND ACCEPTANCE

The Type 2904 flange-to-flange knife gate valves are accepted and produced in accordance with PN-EN 1074-2: 2002 (Valves for water supply. Fitness for purpose requirements and appropriate verification tests. Isolating valves) and PN-EN 12266-1: 2012 (Industrial valves. Testing of metallic valves. Pressure tests, test procedures and acceptance criteria. Mandatory requirements). All valves (100%) are subject to tightness testing. The tests include external body tightness and closing tightness.

2.7 MARKINGS

The valve marking is regulated by the following standards: PN-EN-19: 2005, PN-EN-1074-1: 2002.

The valve bodies feature markings on the front and back walls of the body chamber. The marking contains the following data:

- valve type (defined by the product reference standard number)
- nominal diameter
- nominal pressure
- body material type
- manufacturer trademark

The location on the valve specified in the documentation features the nameplate which contains the following data:

- manufacturer's company name and logo
- serial number
- sealing temperature rating
- construction mark "B" and/or mark "CE" (as applicable)
- product type.

3 PROTECTION, STORAGE & TRANSPORT

3.1 PROTECTIVE COATINGS

All inner and outer cast-iron and steel surfaces are protected with electro-deposited epoxy coat. The coat has been approved for contact with foodstuffs.
The anti-corrosion coating layer minimum thickness is 250μm.
The casting surface is pre-treated for epoxy coating in accordance with the relevant technical documentation and PN-EN ISO 12944-5: 2009.
The stem to body and to nut mount fastening bolts are made of stainless steel (A2).

3.2 PACKAGING

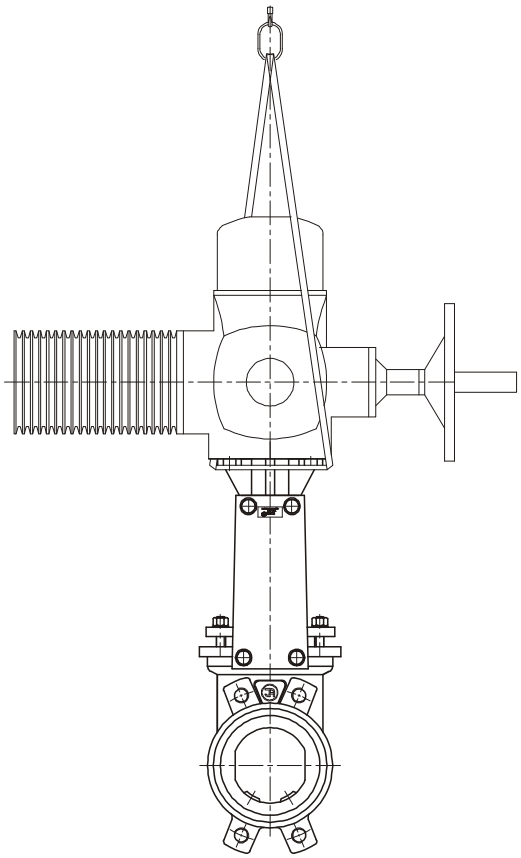
The Type 2904 knife gate valves are packed on EURO pallets (1200x800) and protected with heat-shrunk film.

3.3 STORAGE

Store the Type 2904 knife gate valves in sheltered rooms.

3.4 TRANSPORT

Transport the Type 2904 knife gate valves on sheltered vehicles.



The manufacturer recommends slings for transport and installation of valve sizes from DN50 to DN700.

4 ASSEMBLY AND INSTALLATION

4.1 ASSEMBLY GUIDELINES

The Type 2904 flange-to-flange knife gate valves can be installed in underground or overground pipelines both in horizontal or vertical orientation. The knife gate valves are designed for mounting between flange ends of the pipelines sized for the PN10 bolt hole layout acc. to PN-EN 1092-2: 1999. Note that the system must not expose the (gate) valve to bending or tensile stress from loading with the weight of unsupported pipeline sections. Assemble with consideration to pressure and temperature compensation of the pipeline.

The knife gate valve allow adjusting the gland (by retightening) to eliminate all leaks through the valve. Reseal the gland by tightening the nuts diagonally to the torque value appropriate for the nut size (see the table below). Once installed and adjusted as above, the gate valve is ready for commissioning.

Any other work related to disassembly of the valve components (except for the gland) may result in loss of seal and warranty rights.

CAUTION!

If the gate valve terminates a pipeline (system), bolt it between flanges on both ends.

Table 3

Bolt thread size	Bolt tightening torque		
	Bolt strength class		
	6.9	8.8	10.9
	[Nm]		
M4	2.7	3	4.3
M5	5	6	8.5
M6	9	11	15
M8	20	25	35
M10	42	51	70
M12	73	87	120
M14	115	135	195
M16	180	210	300
M18	245	290	410
M20	350	410	580
M22	470	560	780
M24	560	710	1000
M27	900	1050	1480
M30	1200	1430	2010
M33	1630	1940	2700
M36	2100	2490	3500
M39	2720	3220	4550

Table of maximum tightening torques for individual bolts for tightening the knife gate valve gland.

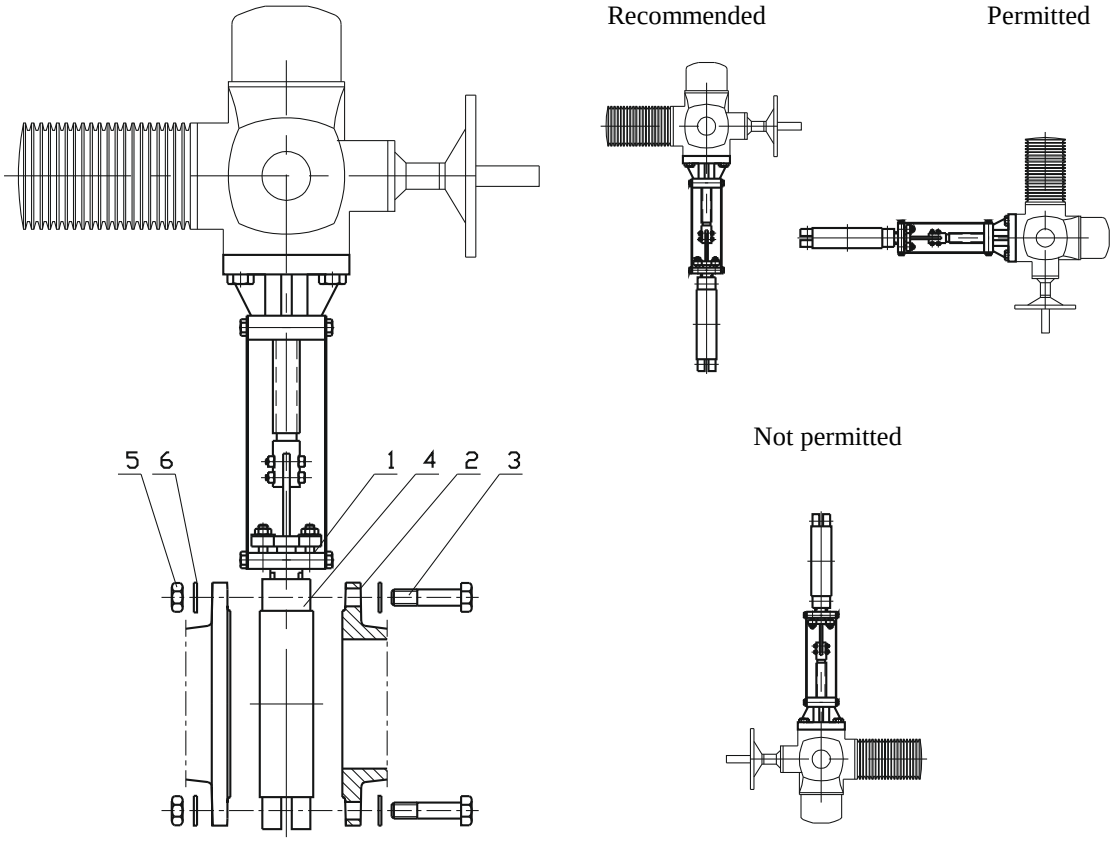
4.2 ASSEMBLY INSTRUCTIONS

Before attempting to install the valve, check the technical and commercial documents delivered with the product to verify that the media and pipeline operating parameters comply with the manufacturer's declaration. Any change in the operating conditions must be consulted with the valve manufacturer beforehand.
Before attempting to assemble the valve, remove the main bore plugs, check the inner surfaces of the valve and thoroughly flush with water, if necessary.
Lubricate the spindle nut via the grease nipple in the nut holder and keep the nut clean.

CAUTION! If the product is damaged mechanically, do not install it in the pipeline.

CAUTION! In the horizontal orientation of installation, supports must be used to relief the strain on the valve.

The figure below shows the assembly method of the gate valve and the valve orientation diagrams:



1. - Knife gate; 2. - Pipeline flange end; 3. - Assembly bolt; 4. - Seal; 5. - Nut; 6. - Washer

Use of bolts for the knife gate valve P/N 2904.

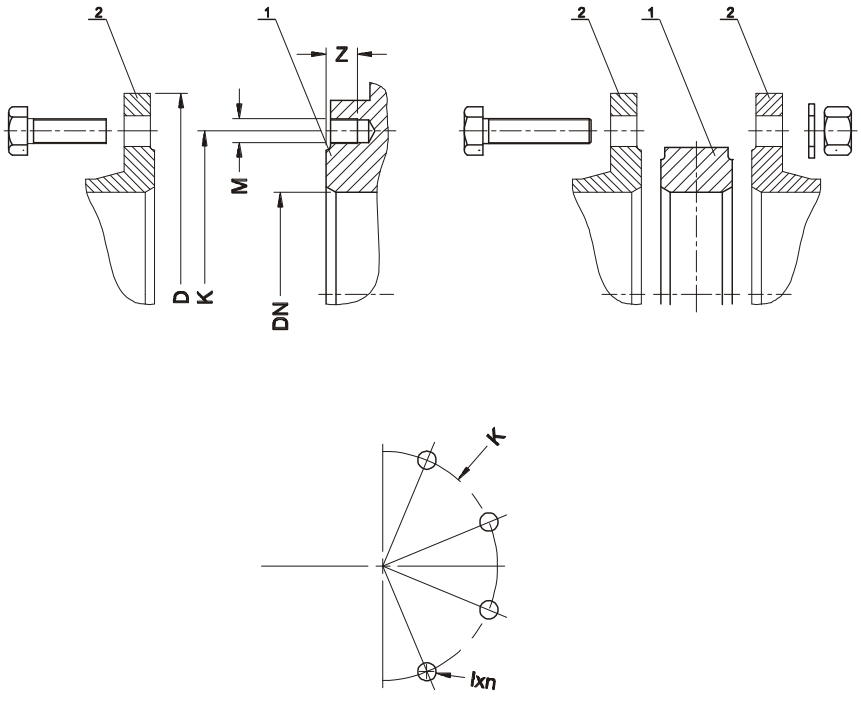


Table 4

DN [mm]	50	65	80	100	125	150	200	250	300	350	400	450	500	600	700
D [mm]	165	185	200	220	250	285	340	395	445	505	565	615	670	780	895
K [mm]	125	145	160	180	210	240	295	350	400	460	515	565	620	725	840
Lxn	4x18	4x18	8x18	8x18	8x18	8x22	8x22	12x22	12x22	16x22	16x22	20x26	20x26	20x30	24x30
Thread-in bolts (l x M x length)	8 M16 x25	8 M16 x25	8 M16 x30	8 M16 x30	8 M16 x30	8 M20 x35	8 M20 x35	16 M20 x40	16 M20 x40	20 M20 x45	20 M24 x50	28 M24 x55	28 M24 x55	28 M27 x55	32 M27
Z [mm]	8	8	9	9	9	10	12	12	12	19	20	24	24	24	-
Bolts with nuts (l x M x length)	-	-	4 M16 x120	4 M16 x120	4 M16 x120	4 M20 x130	4 M20 x140	4 M20 x150	4 M20 x150	6 M20 x180	6 M24 x190	6 M24 x200	6 M24 x200	6 M27 x200	8 M27 x210

4.3 OPERATION

The type 2904 knife gate valve shall be operated according to all relevant requirements for cut-off valves, i.e. either in fully open or fully closed positions. Leaving the gate valve partially opened (or closed) may result in seal failure. In order to guarantee full operating fitness, switch the gate valve periodically (at least every 6 months) (from fully open to fully closed) with the installation on line to self-clean the valve. At the same time visually inspect the gland assembly. If leaks are found, repair it by following Section 4.1.

Exceeding the operating limits of the valve may result in damage that will not covered by the suretyship granted by the manufacturer.

4.4 OCCUPATIONAL HEALTH AND SAFETY

The Type 2904 knife gate valves are eligible for the OHS guidelines and recommendation concerning installation of pipelines and devices for water supply stations, heat power plants, water treatment plants, sewage treatment plants, pumping stations and other facilities, and eligible for the Polish Regulation concerning general OHS laws (use of personal protective equipment for hands, legs and head, and safety garment), especially at work with low or high temperature hazard.

Misuse of this product is prohibited.

5 WARRANTY TERMS AND CONDITIONS

The product assembled, installed and operated in compliance with this Manual is covered by a commercial warranty from the manufacturer. The warranty terms, conditions and period are specified in the relevant Warranty Sheet.