

Users Manual

Flame Spray Gun 15E

115.900





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DECLARATION OF INCORPORATION

According to EG- Machine Guideline 2006/42/EG, Annex II B
EG-Guideline Electrical Magnetically Amicability 2004/108/EG
EG- Guideline „Low Voltage“ 2006/95/EG

Machine:

PLANT: Flame Spraying Equipment
TYPE: 15E
PRODUCTION DATE: 2011
PROJECT NO.: 115.900

IS DEVELOPED AND DESIGNED ACCORDING THE ABOVE MENTIONED NORMS IN FULL RESPONSIBILITY OF


Incorporation: **GTV Verschleißschutz GmbH**
Company Location: Gewerbegebiet, D-57629 Luckenbach, Germany

FOLLOWING STANDARDS:

- DIN EN 12100 Safety of equipment, components and machine units
- DIN EN 13849 Performance Level
- DIN EN 14121 Guidance for risk assessment
- DIN EN 60204-1 Electrical setup for equipment and machines
- BGR 500 Gases

THIS DECLARATION LOSES VALIDITY, IF CHANGES TO THE EQUIPMENT WILL BE DONE WITHOUT GTV AGREEMENT.

Luckenbach, 22.11.2013



S. Kill, Directory Manager



1. Operation

1.1 Operating controls

There are three operating controls on the gun:

1. The Gas Head Valve controls the flow of gases and air to both the gas head.
2. The control panel 115.760 adjusts the rate of wire feed.
3. The wire Grip Handle causes the drive rolls to grip or release the wire.

In addition to the above controls, the gun has a wire grip adjustment cap which adjusts the bite of the drive rolls on the wire. Turning the cap clockwise increases the bite.

The wire grip adjustment cap is set at the factory and does not require daily adjustment. When an adjustment is necessary, you will be easier to turn the cap if the wire grip handle is turned to the horizontal position.

Each gun is given an operating test before leaving the factory and is ready to be hooked up when received. If several months have elapsed between the time the gun is received and is first put into service, it may be necessary to relubricate the valve and the mechanism before the unit will operate smoothly. If the gun has been out of use for sometime it is recommended that it be speeded up and slowed down a few times, when first starting up, by turning the speed control ring.

When putting the gun into operation:

1. Use the nozzle and air cap shown in the Spraying Tables for the wire to be sprayed.
2. Make sure that the nozzle nut is tight, Tightening by hand is sufficient.
3. The siphon plug flange must be firmly seated against the gas head. Make sure the mating surfaces are clean and free of chips.
4. The air cap body must be on tight. Tightening by hand is sufficient.
5. Check the gas head valve for smooth, easy action. Relubricate if necessary.



1.2 Hook up and initial adjustments

Connect hoses to the air and gas control units. Blow out the hoses and then connect to the gun. Air and oxygen hose nuts have right hand threads and the fuel gas hose has a left hand thread. The hose nuts must be drawn up tight enough to prevent leakage but should not be over tightened as this may crush the hose stem. Point the gun into the spray booth or towards the job.

Open the gas head valve by turning the valve handle straight up and adjust the air pressure at the regulator until the gauge shows the pressure specified in the Spraying Tables.

If the valve is now turned off (horizontal) the pressure gauge should not show more than 0,7 kg/cm² (10 psig) increase.

A greater pressure rise usually indicates regulator trouble or a restriction upstream from the air control unit. In either case the trouble should be corrected before proceeding.

Turn the valve handle up at 45 degrees until it clicks. This is the lighting position. Turn the valve handle all the way up and a strong blast of air will come out of the air cap. This is the running position. The wire grip handle has two positions: Forward (on) and Upward (off).

With the gas head valve in the running position and the wire grip handle turned up (in the wire - release or off position) insert the wire into the rear wire guide and push it through the gun. Turn the wire grip handle forward (horizontal).

Adjust control panel to a slow feed for hard wire such as steel or bronze, or a fast feed for soft wire such as aluminium or zinc.

With the gas head valve open, quickly set the oxygen and fuel gas pressures to the figures shown in the Spraying Tables under lighting pressures. Adjust the flow meter with the help of gas regulators to the flow values shown in the table. Then close the gas head valve.

1.3 Lighting

When you are ready to start spraying:

1. Take up the gas lighter and open the gas head valve all the way (straight up).
2. Pause about three seconds.
3. Close the valve halfway until you feel it click into the lighting stop.
4. Spark the lighter in front of the nozzle.
5. Immediately open the valve all the way as soon as the gun lights.

There is no need for a new operator to hurry the several motions required except that the valve must be opened completely immediately after lighting.

1.4 After the gun is lighted

1. Then start the wire feed.
2. Set the speed control to obtain the highest wire speed which will allow the wire to melt off to a point without spattering. The wire should extend in front of the air cap about 5mm. This length, however, will vary, depending upon the kind of coating desired and the metal being sprayed.
3. Readjust the fuel gas and oxygen regulators until the readings on the Gas Flow Meter correspond to the Spraying Tables.

Caution: Do not light gun without wire in the nozzle.



1.5 Spraying

The gun should be held from 12,5 cm to 20 cm away from the surface being sprayed. For small work, such as shafts less than 2,5 cm in diameter, it is advisable to cool the work with air blast.

1.6 Start-Stop operation

The wire feed can be stopped temporarily when spraying by simply turning the wire grip handle up to release the grip of the drive rolls. The wire snubber located at the back of the gun will keep the wire from slipping free of the gun.

Make sure the outer sleeve of the snubber is in the operating position (rearward).

CAUTION:

Do not operate the gun with wire snubber locked out. If during operation, the wire grip is released with the snubber locked out, the wire may pull back out of the gun. If this happens, the gun flame may flash back through the rear wire guide. The hot tip of the wire and the back- flash of the flame can cause personal injury.

To start the wire feed again, return the wire grip handle to the `ON` position.

When spraying low melting point wires in occasional start stop operation, the standard nozzles and air caps will be satisfactory. However, frequent start and stop may cause these parts to load with sprayed metal. For this type of operation, special non- load nozzles and air caps are available.

Plain rear guides (without the snubber mechanism) are available. These are never to be used when operating start- stop.

1.7 Shutting down

To shut the gun down, turn off the gas head valve. To release the wire:

1. Turn the wire grip handle up.
2. Push the snubber outer sleeve forward. (The sleeve can be locked in the forward position by twisting it in the direction of its arrow).

If the gun will not be used again for several hours shut off the oxygen and fuel gas at the cylinders and shut off the air at the regulator on the air control unit. It is also good practice to back out the pressure regulating screws on the gas pressure regulators and bleed off pressure in the hoses and gun by opening the gas head valve momentarily.

1.8 Different wire sizes

The Standard 15 E Gun is equipped to spray 3,17mm wire.

It may be ordered set up to spray any size standard metalizing wire from 4,76mm down to 1,6mm. It is also frequently desirable to purchase nozzles and air caps for a number of different sizes in order to be able to handle a wider variety of jobs.

Changing, wire size will require a change of nozzle and air cap. Follow the recommendation in the appropriate Spray Table toward the end of this manual.

Drive rolls, drive roll gears and wire guides may also have to be changed.



1.9 Special gears

For production spraying of high- speed wires (such as zinc) which would require the standard 15 E to be run at or near top speed, a special high speed turbine worm and countershaft gear set should be installed. This is easily done.

Use of this special gear set has the following advantages:

1. It will permit the maximum spray rate for those wires such as lead, tin and babbitt, which can be sprayed faster than the standard 15 E can feed them.
2. Wear on the gears, turbine bearings and govern or parts will be reduced.
3. Speed adjustment will be easier to make.

1.10 Different gases

15 E Gun is equipped with a universal gas head. It may be used with oxygen and any combustible gas such as acetylene, propane, manufactured gas, or hydrogen. The proper nozzle and siphon plug must be used.

1.11 Nozzles

There are two types of wire nozzles, acetylene, propane (or LPG). The nozzles for acetylene flat on the small end. The propane nozzle is counter bored on the small end. Each nozzle has its wire size mark given on it.

1.12 Siphon plugs

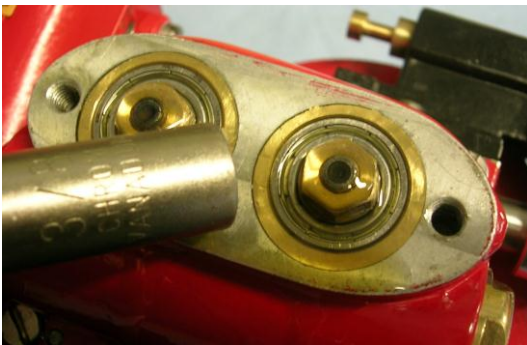
Different siphon plugs are required for various wire sizes and fuel gases. See the nozzle and siphon plug selection in the spare parts list.

1.13 Turbine shaft and countershaft gear

First dismantle the both screws of the bearing cover (112.047).



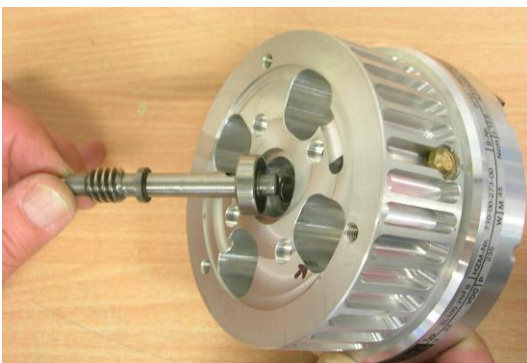
When the bearing cover is dropped of, the nut of the right bearing (112.084) must be detached.



Following resolve the three screws (112.053) on the body and unplug the complete motor inclusive the turbine shaft (115.092) out of the pistol.

Now the turbine shaft can be removed. This occurs with a carefully reciprocation motion.

To assembly, take of the bearing (115.704), plug it on the turbine shaft and put it together in the oval fit of the motor shaft.



Afterwards put the o-ring (115.705) back in the flute.

To fix the motor, the arrowhead onto the motor adapter must be visible in the bore of the body.



2. Avoiding trouble

2.1 Spraying

Refer to Chapter Safety Measures for a summary of commonsense precautions to be observed when flame spraying.

2.2 General gun care

The most important point in the care and lubrication of 15 E Metalizing Gun is cleanliness. Dirt, grit and metal dust in the mechanism cause quick wear.

Before lubrication or overhaul, wipe the gun thoroughly to remove all loose dust. Use a clean bench for disassembly and be sure the lubricant tube is free of dirt.

There is a chart showing a suggested maintenance schedule at the end of this chapter. This chart is based on average use and conditions.

Guns receiving hard use should be serviced at shortest intervals. The main factors affecting service frequency are:

1. Speed and load of the gun.
2. Frequency of lighting.
3. Temperature in which the gun operates.

The higher each is, the more often the gun should be serviced.

2.3 Hoses

Obstruction in the hoses reduces the flow of oxygen and gas and upset the flame balance.

Do not get oil in the hoses. Oil in the oxygen hose is very dangerous. In any hose, oil will soften the rubber.

In an old, worn hose the lining may come loose and plug the hose.

If hose fittings are over-tightened, the holes in the fittings may collapse. This reduces the flow of gases and causes the same troubles as obstructions in the hoses.

2.4 Difficult lighting

If the gun is hard to light, make sure that the nozzle and siphon pug jets are clean and undamaged. If the trouble persists screw out the regulator handles to shut off the gases and then disconnect the hoses. Inspect hoses and gun fittings for dirt or other obstruction. Blow out the hoses before reconnecting them.

If the gun has been idle for some time or after the valve has just been lubricated, it is advisable, before lighting, to work the valve on an off a few times with gases and air turned on. This will blow out any excess valve lubricant from the small bleeder holes in the valve, Plugged bleeder holes will cause lighting trouble.



2.5 Backfire

If the gun backfires, it will appear to go out with a `pop` and will burn back in the siphon plug. Shut the gun off immediately and wait for about thirty seconds before relighting.

Backfiring may be caused by the following:

1. Leak at the wire nozzle seat (see wire nozzles).
2. Dirt in the nozzle jets.
3. Oversized or ragged nozzle jet holes.
4. Plugged siphon plug bleeder holes (see siphon plug)
5. Use of wrong air cap.

It is possible for a single jet to backfire and the others to burn normally. The flame will suddenly become slightly to prevent overheating the siphon plug and gas head. Replacing the nozzle and cleaning the siphon plug is the best and most economical procedure.

Excessive backfire or permitting the gas to burn back in the siphon plug too long makes it necessary to clean the jets in the siphon plug and nozzle. It may also cause the nozzle nut to loosen.

The cause of the backfire should be found and corrected. The gun will not backfire unless something is definitely out of adjustment.

2.6 Siphon plug

These parts should be cleaned occasionally. Clean the jets with the proper size wires in the cleaning wire kit. Do not use drills. Do not use oversize wires. Do not rotate the wires.

There are two small air bleeder holes in the siphon plug just back of the nozzle seat. These holes permit air to circulate around the wire. If they plug up, the wire nozzle may overheat, causing backfire or sticking wire. When servicing the siphon plug, be sure to clean these bleeder holes with the proper size cleaning wire.

Do not wash the o-rings with strong solvent. Inspect them for damage and replace them if necessary. Do not stretch new o-rings more than necessary when putting them on the siphon plug. Lubricate the o-rings with a generous film of Valve lube before reassembling the siphon plug. Wipe and excess Valve lube off the plug to avoid getting it in the jets.

2.7 Wire nozzle

The nozzle must be tight on the siphon plug. Firm tightening by hand is sufficient.

The tip of the nozzle at the flame end should be kept clean.

To clean the jet holes, remove the nozzle and push the proper size cleaning wire carefully into the jet hole from the back end. Do not use a drill. Select a wire that fits the hole. Push the wire straight in and out. Do not rotate it. Wash the nozzle in cleaning solvent before and after cleaning. Blow out the holes from the flame with compressed air.



2.8 Gas head valve

The gas head valve is designed for long service life with minimum maintenance. It has a cylindrical rather than the old-style tapered core and realises upon special elastomeric o-rings for proper sealing. Lapping or other precise fitting is not required. One of the two acetylene holes is stepped, having larger diameter at the periphery of valve.

Do not disassemble the valve for cleaning and relubricate, unless it has become excessively stiff and difficult to turn or a leak has developed.

If the valve develops a leak, examine all o-rings carefully and replace any which are worn or damaged. The ring materials are specially selected for proper service in this valve. Use only authorised replacements.

The metal parts of the valve can be washed with cleaning solvent. Make sure the small bleeder holes in the cylindrical valve core are clean and free of any hard residue. Do not enlarge them.

Never soak the o-ring in solvent.

Lubricate all valve o-rings and sliding metal parts with a thin coat of valve lube. Wipe excess valve lube off the nozzle, to avoid getting it in the jet holes.

2.9 Wire grip adjustment

Do not use more drive roll pressure on the wire than is needed for a smooth, steady feed. Too much pressure will shorten the life of the drive rolls, gear and bearings. With soft wires, high pressure may flatten the wire and cause it to jam in the nozzle.

2.10 Sticking wire

Kinked or badly bent wire causes trouble. The drive rolls will gouge the wire and it may stop feeding. If the wire melts into the end of the nozzle it can be removed by twisting and forcing the wire through from the back with pliers. The nozzles are bushed with a special alloy which resists fusing with any common metal.

To reduce sticking due to kinks and beds, especially with 1/8" and 3/16" hard wire, locate the wire control unit so the wire feeds straight to the gun. Do not over tighten the brake on the wire control unit.

2.11 Drive rolls

If the teeth on the drive rolls become packed with chips from the wire they will not work efficiently. Keep them clean with wire brushing.

2.12 Threads

Valve lube is an excellent thread lubricant. It should be used on the threads of the air cap body, nozzle nut, rear countershaft bearing retainer and control ring to keep the threads smooth-running.

2.13 Overheating

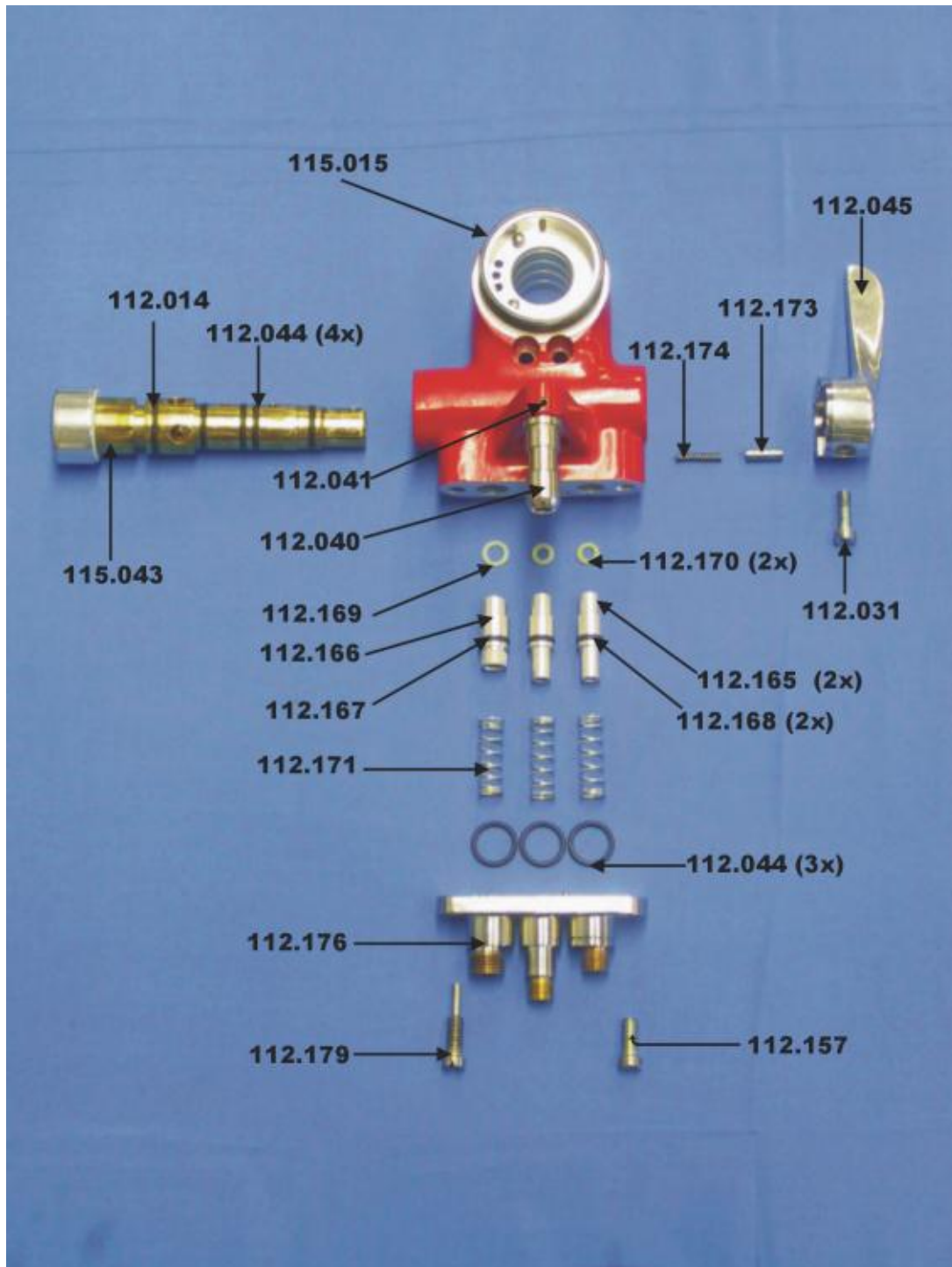
The increased spraying speeds of the 15 E Gun are the result of greatly increased heating capacity. Be sure to observe recommended procedures to prevent overheating the work or damaging the coating.

3. Normal lighting flows

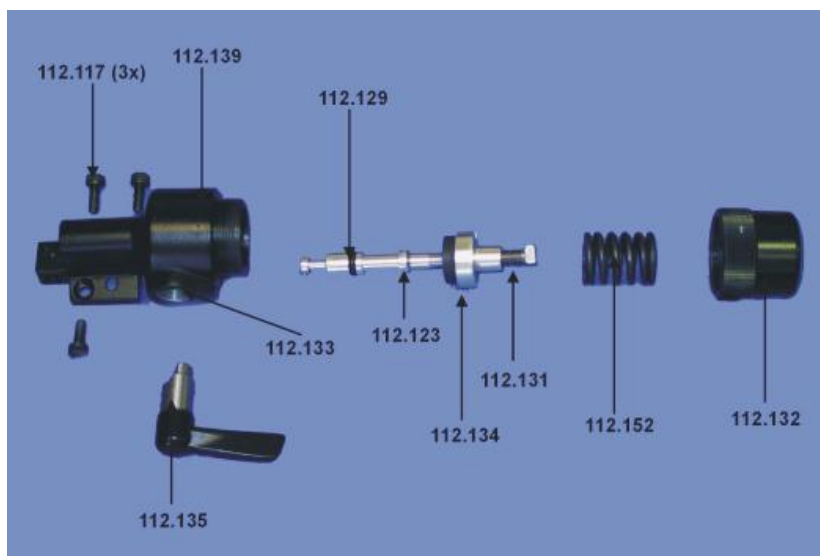
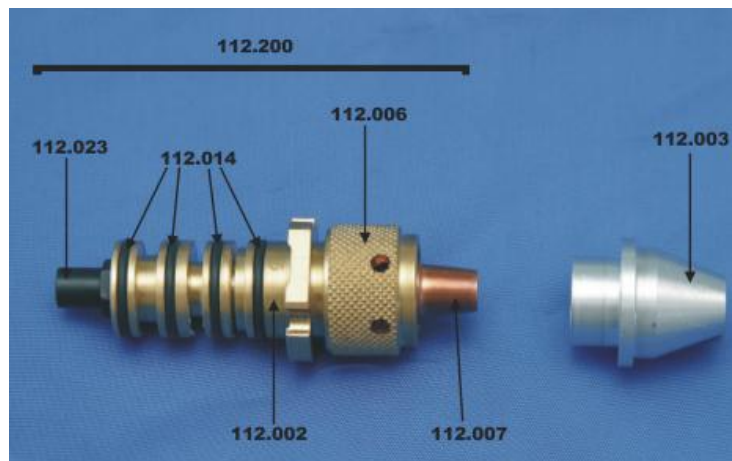
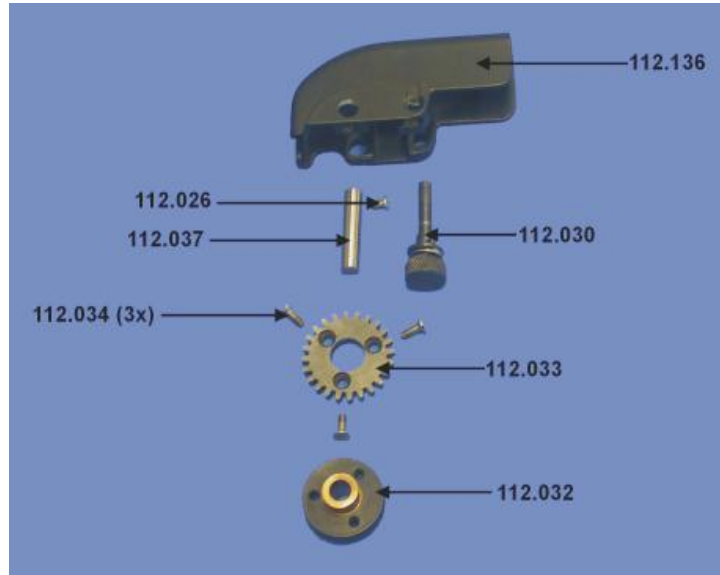
Fuel Gas	Wire Size mm	Lighting Pressure Kg/ cm ²		Lighting flow	
		Oxi	Fuel	Oxi	Fuel
ACETY- LENE	4,76	2,71	1,07	22-30	3-5½
	3,17	2,00	1,07	22-30	3-5½
	2,50	1,78	1,07	17-24	3-5½
	1,50	1,78	1,07	16-23	3-5½

CAUTION: Use only standard replacement parts of 15E

4. Spare parts



GTV-No.	description
112.001	air cap body
112.005	gas head assembly
112.014	o-ring (valve core)
112.015	gas head sub assembly (incl. 112.040, 112.041)
112.031	valve handle screw
112.040	mounting stud
112.041	mounting stud roll pin
112.043	valve core
112.044	o-ring
112.045	valve handle assembly
112.096	gas head mounting screw, rear
112.097	gas head mounting screw, front
112.157	hose connection block mounting screw
112.165	plunger (fuel gas & oxygen)
112.166	plunger (air)
112.168	o-ring (plunger fuel gas & oxygen)
112.169	plunger seal o-ring (air)
112.170	plunger seal o-ring (fuel gas & oxygen)
112.171	plunger spring
112.173	detent pin
112.174	detent pin spring
112.176	hose connection block
112.179	valve core stop screw
112.184	gas head valve o-ring package
112.186	plunger o-ring (air)



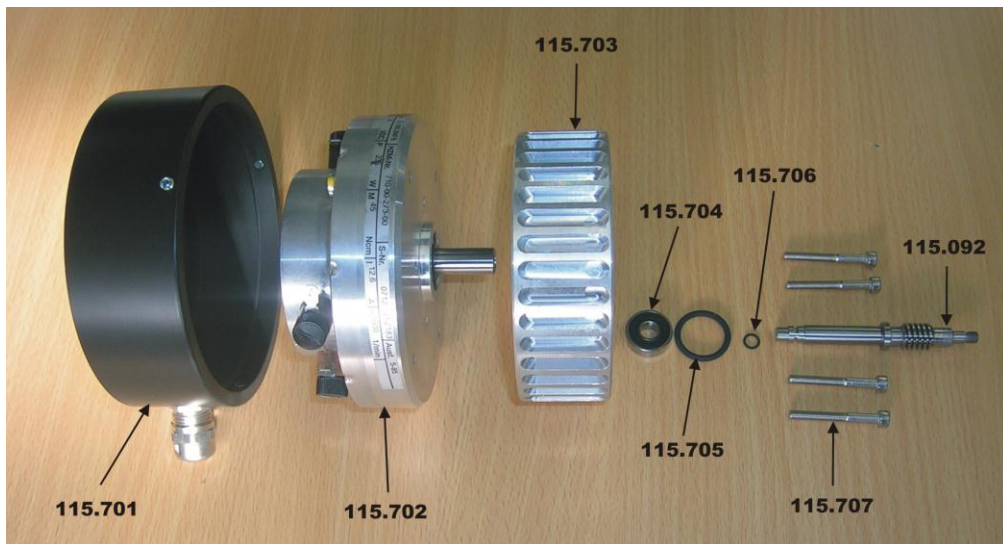
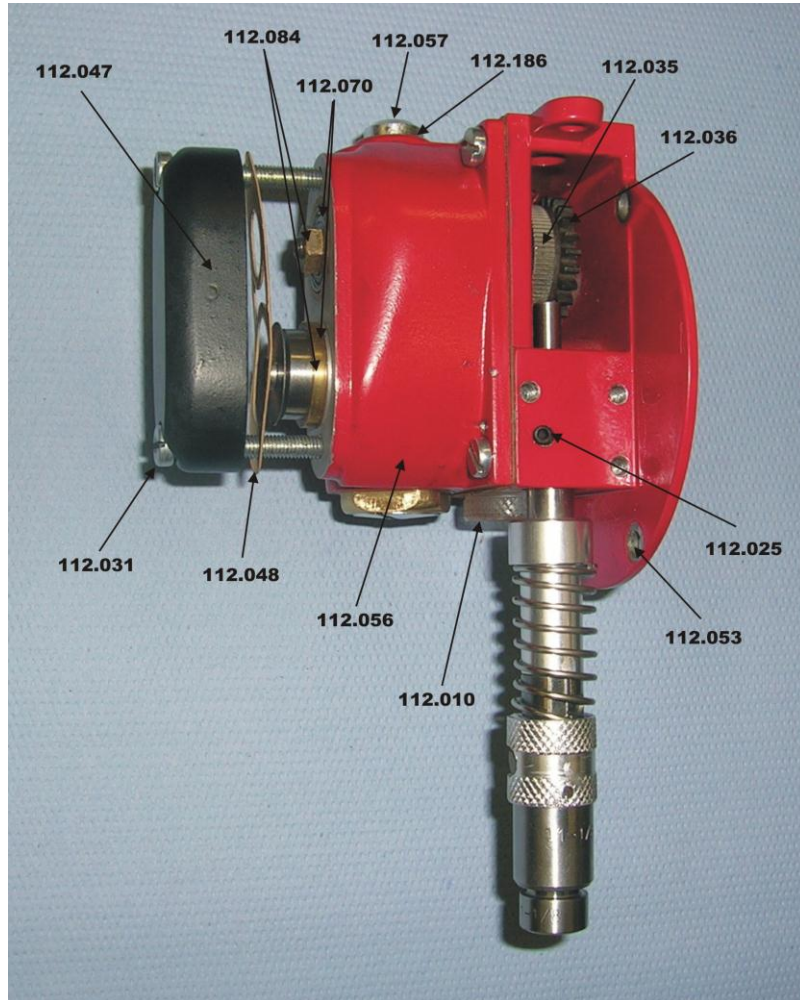
GTV-No.	description
112.002A	siphon plug (acetylene)
112.002P	siphon plug (propane)
112.003AH	air cap AH
112.003C	air cap C
112.003CH	air cap CH
112.003EC	air cap EC
112.003J	air cap J
112.003EA	air cap EA
112.007A1	nozzle - 11 gage (acetylene)
112.007A1-6	nozzle - 11 gage (acetylene) (6 hole)
112.007A1NL	nozzle - 11 gage (acetylene) (non load)
112.007A2	nozzle - 1/8" (acetylene)
112.007A2NL	nozzle - 1/8" (acetylene) (non load)
112.007A4	nozzle - 3/16" (acetylene)
112.007A4NL	nozzle - 3/16" (acetylene) (non load)
112.007P1	nozzle - 11 gage (propane)
112.007P1NL	nozzle - 11 gage (propane) (non load)
112.007P2	nozzle - 1/8" (propane)
112.007P2NL	nozzle - 1/8" (propane) (non load)
112.007P4	nozzle - 3/16" (propane)
112.007P4NL	nozzle - 3/16" (propane) (non load)
112.007M	nozzle - MAPP

GTV siphon plug assembly 112.200

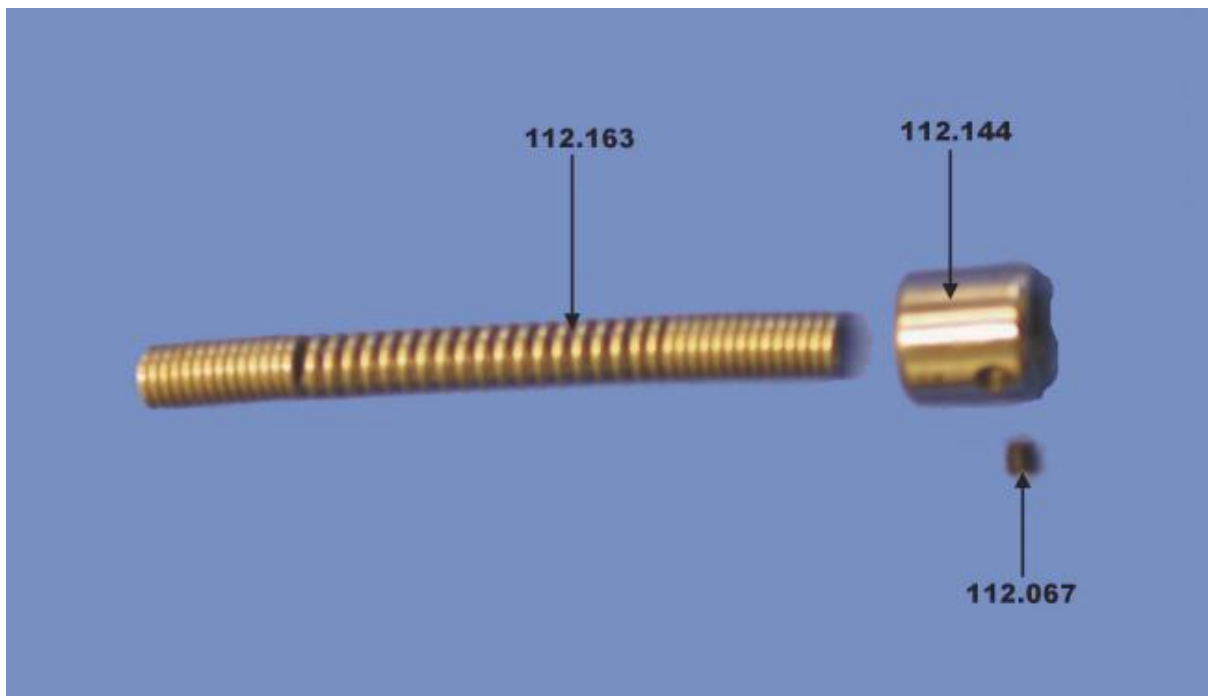
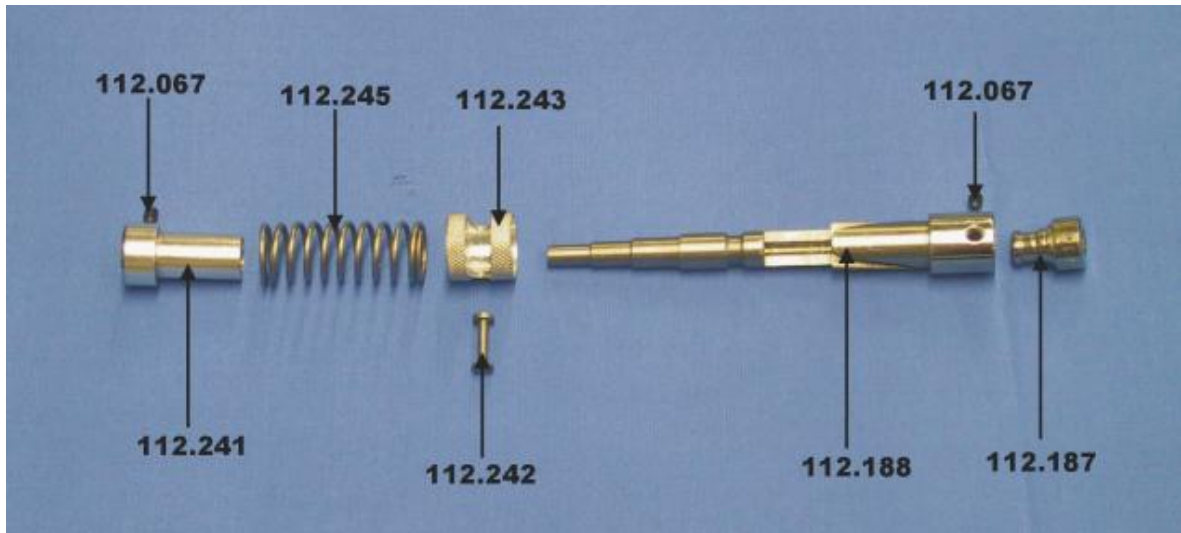
112.200	siphon plug assembly (incl. nozzle, wire nozzle nut, o-rings, wire guide front)
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When ordering GTV siphon plug assembly 112.200, specify wire size and fuel gas to be used.

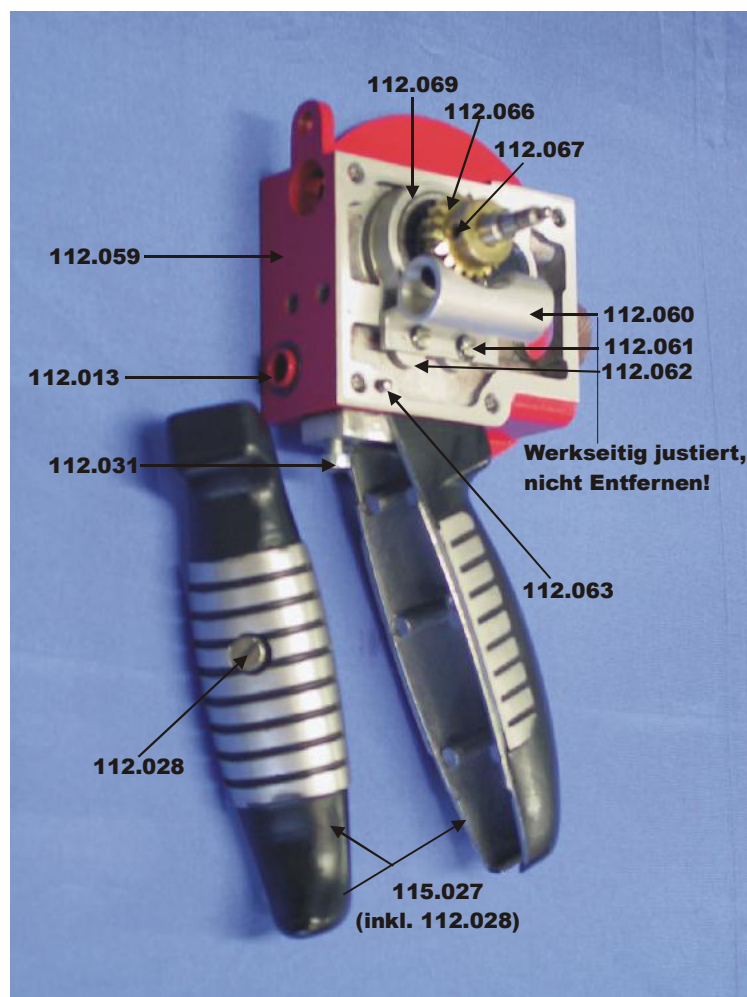
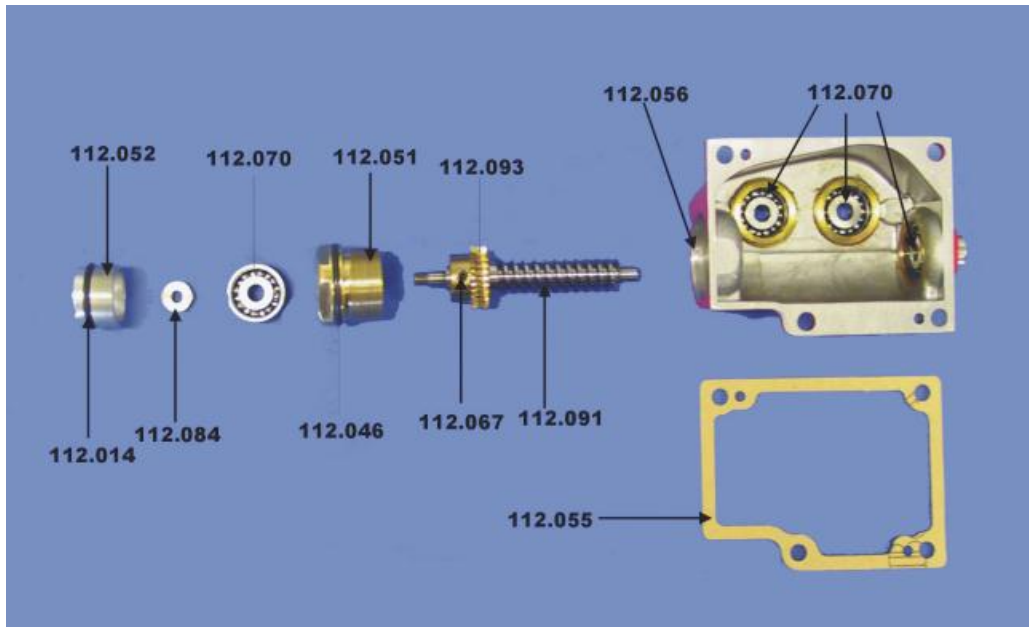
GTV-No	description
112.004AB	fan spray air cap type AB
112.004CD	fan spray air cap type CD
112.006	nozzle nut
112.023-3/16	front wire guide 3/16" – 1/8"
112.023-1/8	front wire guide 1/8" – 11 ga.
112.026	upper drive roll axle screw
112.030	drive roll carrier pivot pin
112.032-3/16	upper drive roll 3/16" – 1/8"
112.032-1/8	upper drive roll 1/8" – 15 ga.
112.033	upper drive roll gear
112.034	upper drive roll gear screw
112.037	upper drive roll gear axle
112.108	o-ring (nozzle – large)
112.109	o-ring (nozzle – small)
112.117	support block mounting
112.123	push rod
112.129	push rod seal
112.131	locking screw
112.132	spring cap
112.133	screw
112.134	cam follower assembly
112.135	cam assembly
112.136	drive roll carrier
112.139	support block
112.143	strain relief assembly
112.144	strain relief bushing
112.152	spring
112.190	o-ring package (siphon plug and nozzle)



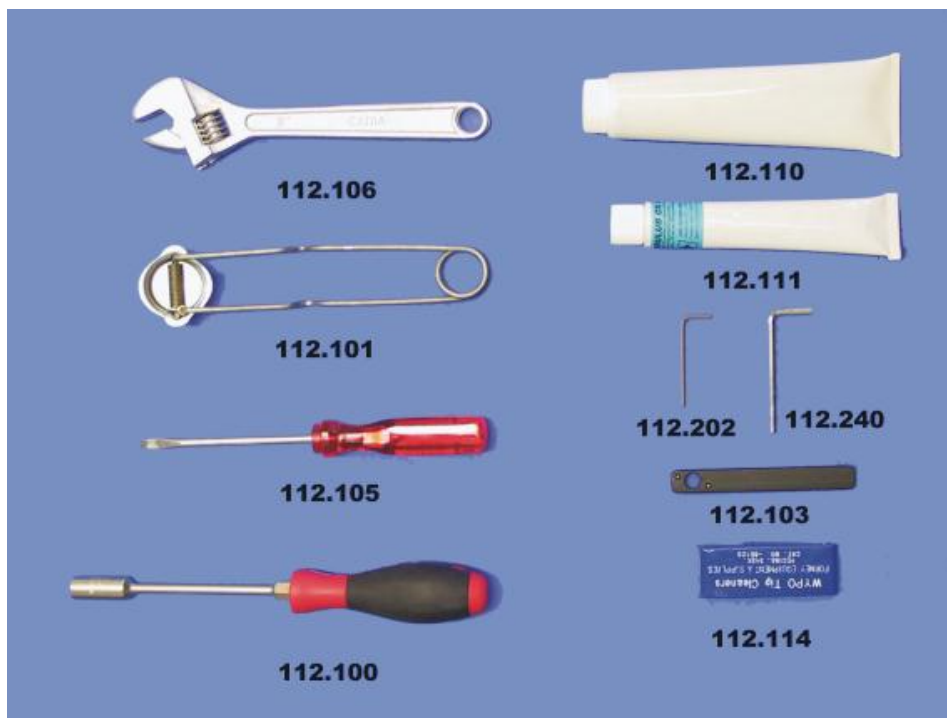
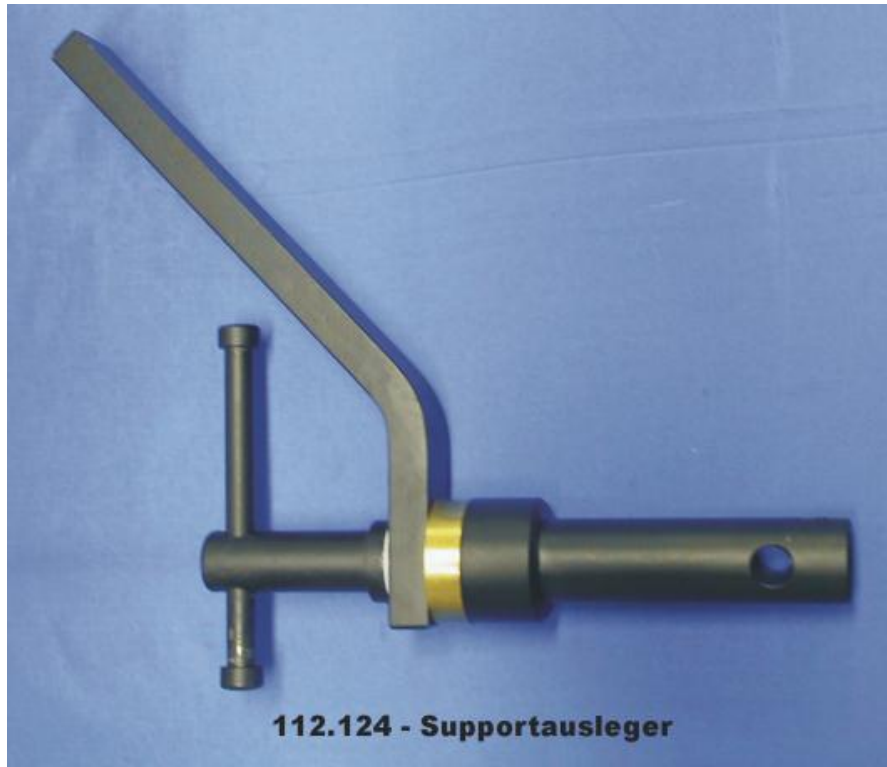
GTV-No.	description
112.010	oil sight plug
112.025	screw for rear wire guide
112.031	bearing cover mounting screw
112.035	lower drive roll 1/8" - Kal.11
112.035-3/16	lower drive roll 3/16" - 1/8"
112.036	lower drive gear
112.039	bearing follower sub-assembly
112.047	bearing cover
112.048	gasket (bearing cover)
112.053	screw (gear cover)
112.056	gear cover
112.057	screw (plug)
112.070	ball bearing
112.084	nut (left bearing)
115.092S	turbine shaft (standard)
115.092H	turbine shaft (high speed)
112.186	o-ring plug screw
115.701	motor housing
115.702	motor
115.703	motor adapter
115.704	ball bearing
115.705	o-ring adapter
115.706	o-ring turbine shaft
115.707	screw adapter



GTV-No.	description
112.067	set screw
112.115	snubber cover (not shown)
112.116	roller and pin assembly (not shown)
112.118-3/16	snubber assembly 3/16" – 1/8"
112.118-1/8	snubber assembly 1/8" – 11 ga.
112.119	roller spring (not shown)
112.120	anchor ring (not shown)
112.143	strain relief assembly (incl. 112.067, 112.144, 112.163)
112.144	bushing
112.146	snubbing rear wire guide (small gage) (not shown)
112.147	snubbing rear wire guide (1/8" – 11 ga.) (not shown)
112.148	guide insert (1/8" – 11 ga.) (not shown)
112.149	cover mounting screw (not shown)
112.163	spring
112.187	guide insert 3/16" – 1/8"
112.188	snubbing rear guide 3/16" – 1/8"
112.224	guide insert n1/8" – 11 ga. (not shown)
112.241	spring retainer
112.242	roller
112.243	snubber spring housing
112.245	spring



GTV-No.	description
112.013	o-ring
112.014	countershaft plug o-ring
115.027	gun handle (incl. 112.028 – screw)
112.028	gun handle screw
112.031	gun handle mounting screw
112.046	bearing retainer o-ring
112.051	rear bearing retainer
112.052	retainer plug
112.055	gear cover gasket
112.056	gear cover
112.059	central housing (incl. 112.013, 112.060, 112.061, 112.062, 112.063)
112.060	pump housing
112.061	pump housing mounting screw
112.062	pump housing lockwasher
112.063	dowel pin for mounting gear cover
112.065	drive shaft
112.066	drive shaft gear
112.067	gear set screw
112.068	drive shaft seal (not shown)
112.069	right ball bearing for drive shaft
112.070	front & rear ball bearing for countershaft, left ball bearing for drive shaft
112.084	nut for countershaft front bearing
112.091	countershaft
112.093S	countershaft gear, standard
112.093H	countershaft gear, high speed



GTV-No.	description
112.098	face block
112.099	spring
112.100	socket wrench
112.101	lighter
112.103	drive roll tool
112.104	spanner wrench
112.105	screw driver
112.106	adjustable wrench
112.110	gearlube
112.111	valvelube
112.114	cleaning wire kit
112.124	tool post fixture
112.126	clampshaft housing
112.127	clampshaft
112.128	pin
112.130	handle assembly
112.150	fixture bar
112.156	face block mounting screw
112.175	handle washer
112.202	hex key, 3 mm
112.240	hex key, 2 mm





GTV-No.	description
115.760	control panel
115.990	poti (incl. cable for motor)

Recommended spare parts

The list which follows is a conservative inventory of expendable spare parts for GTV flame spray gun type 112.000 gun. It is recommended that the owner have these spare parts on hand at all times. The ability to make immediate replacements can save a great deal of time and trouble.

quantity	GTV-No.	description
2	112.003	air cap
3	112.007	nozzle
12	112.014	siphon plug o-ring
1	112.023	front wire guide
1	112.032	upper drive roll
1	112.035	lower drive roll
3	112.108	o-ring (nozzle – large)
3	112.109	o-ring (nozzle – small)
1	112.110	GTV gear lube
1	112.111	GTV valve lube



5. Spraying table

material	GTV- No.	equipment			ignition pressure						flow meter- adjustment			consumption pro minute			wire consumption in gram / m ² - 0,1mm coating strength	hourly application in m ² - 0,1mm coating
		wire- and nozzle- size	air- cap	gear	oxygen		acetylene		air		oxy- gen	acety- lene	air	wire g	oxy- gen l/min	acety- lene l/min		
					PSI	bar	PSI	bar	PSI	bar								
aluminum	50.11.4	3/16"	EA	S	40	2,8	15	1,0	70	4,8	48	48	44	122	45	23	280	26,22
	50.11.2	1/8"	EC		35	2,4	15	1,0	65	4,5	43	40	43	90	38	18		19,66
babbitt	50.09.4	3/16"	EA	H	35	2,4	15	1,0	65	4,5	38	48	44	717	30	18	970	44,25
	50.09.4	3/16"	EA		40	2,8	15	1,0	70	4,8	43	55	44	1400	40	28		86,85
	50.09.2	1/8"	EC		35	2,4	15	1,0	65	4,5	28	41	43	683	23	18		41,79
	50.09.2	1/8"	EC		35	2,4	15	1,0	65	4,5	29	29	43	300	20	12		18,85
brass	50.22.2	1/8"	EC	S	35	2,4	15	1,0	65	4,5	44	40	43	182	40	18	970	11,47
molybdenum	50.07.2	1/8"	EC	S	40	2,8	15	1,0	65	4,5	50	35	42	57	45	14	1100	3,28
	50.07.1	11	J		30	2,1	15	1,0	60	4,1	38	28	38	33	33	14		1,97
tin/bronze	50.15.2	1/8"	EC	S	35	2,4	15	1,0	65	4,5	44	40	48	113	40	18	970	7,05
copper	50.12.2	1/8"	EC	S	35	2,4	15	1,0	65	4,5	44	40	43	182	40	18	970	11,47
13% Cr-steel	50.02.4	3/16"	EA	S	40	2,8	15	1,0	70	4,8	48	45	44	122	47	22	890	8,19
	50.02.2	1/8"	EC		35	2,4	15	1,0	65	4,5	44	40	43	98	40	18		6,56
Cr Ni Mo Mn-steel	50.04.2	1/8"	EC	S	35	2,4	15	1,0	65	4,5	44	40	43	98	40	18	890	6,56
Cr Ni Mn- steel	50.05.4	3/16"	EA	S	40	2,8	15	1,0	70	4,8	48	45	44	122	47	22	890	8,19
	50.05.2	1/8"	EC		35	2,4	15	1,0	65	4,5	44	40	43	98	40	18		6,56
Monel	50.21.2	1/8"	EC	S	35	2,4	15	1,0	65	4,5	44	40	43	113	40	18	970	6,88
nickel	50.08.2	1/8"	EC	S	35	2,4	15	1,0	65	4,5	44	40	43	75	40	18	970	4,92
0,8% C-steel	50.13.2	1/8"	EC	S	35	2,4	15	1,0	70	4,8	46	33	43	98	42	15	830	7,37
1% C-steel	50.14.4	3/16"	EA	S	50	3,4	15	1,0	70	4,8	50	40	44	137	48	18	830	9,83
	50.14.2	1/8"	EC		35	2,4	15	1,0	70	4,8	45	33	43	98	42	15		7,37
tin	50.70.2	1/8"	EC	H	35	2,4	15	1,0	65	4,5	44	24	43	302	40	9,5	970	18,85
	50.70.2	1/8"	EC		35	2,4	15	1,0	65	4,5	42	29	43	718	38	12		63,09
zinc	50.10.4	3/16"	EA	S	35	2,4	15	1,0	70	4,8	48	45	44	492	45	22	970	30,32
	50.10.2	1/8"	EC		35	2,4	15	1,0	70	4,8	45	40	43	242	40	18		14,75
prepared surface Ni/Al	50.00.2	1/8"	C	S	35	2,4	15	1,0	70	4,8	44	39	47	38	40	23	830	2,62