

**0 Manual Contents****0.1 Log of Revisions**

Rev no.	Pages	Reference	Rev. date
1	0-1, 0-3, 0-4, 0-5, 0-6, 0-8, 0-11, 1-27, 3-4, 4-16, 4-19, 4-21, 10-2, 10-8, 11-2, 11-18, 11-20	TN 8017, necessary changes to the power plant	Nov. 2010
2	0-1, 0-3, 0-7, 1-1, 1-7, 1-11, 1-12, 8-3	TN8019, wheel brake actuated by airbrake handle.	Feb. 2011
3	Title page, 0-1, 0-3, 0-4, 0-6 ÷ 0-8, 0-11, 1-3, 1-7 ÷ 1-9, 1-22, 1-29, 1-36, 1-40, 1-48a, 4-1, 4-21, 4-27, 6-4, 10-2a, 11-15, 9E2	ÄM LS8-1, Miscellaneous improvements Ser.no. 8474 and from ser. No. 8527 on	December 2011
4	0-1, 0-3, 0-7, 1-17, 8-1	TN 8021 Small tailwheel	January 2015
5	0-1, 0-4 up to 0-8, 1-28, 1-30, 3-7, 4-12, 4-13, 4-23, 4-24, 4-28, 6-1, 6-2, 9-1, 10-2, 10-2a, 10-9	Mechanical fuel pump Manual revision TN LS10-03	October 2015

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	9E2	28.11.2008			

**1. SYSTEM DESCRIPTION AND ADJUSTMENT DATA** (continued)**1.9 Propulsion System** (continued)**1.9.8 Torque and securing of screwed joints**

For all screwed joints at the engine, the following torque values from the engine manufacturer are valid:

Item	Nm	mkg	ft*lbs
Ignition plug	20	2.04	14.75
Decompression valves	20	2.04	14.75
Hub (on crankshaft) M12 x 1 <b>left-hand thread</b>	50	5.10	36.90
Cylinder head nuts M6, width over flats 9 mm	12	1.22	8.85
Cylinder head nuts M8, width over flats 12 mm	20	2.04	14.75
Cylinder base studs (Necked down bolts) M8	13	1.325	9.585
Power plant axle in fuselage side thread	70	7.14	51.6
Power plant axle counter nut	50	5.10	36.90
Other bolts and nuts	M4	3	0.31
	M6	10	1.02
	M8	23	2.34
Slotted bolts and corresponding nuts	M3	0.9	0.092
	M4	2	0.204
	M5	4	4.08

All bolts screwed into engine, which cannot be secured by self-locking nuts must be secured with Loctite 243. These must be marked with red securing paint afterwards: A line from bolt head to structural part.

When removing such bolts, remove securing paint before loosening bolt.

**1. SYSTEM DESCRIPTION AND ADJUSTMENT DATA** (continued)**1.10 Fuel System** (continued)**1.10.3 Fuel pumps**

**Electrical fuel pump:** The electrical fuel pump is mounted at the rear of the feeder tank. Electrical supply from the electrical system, control by DEI-NT.

When the DEI-NT fuel pump switch is in “AUTO” position (normal operation) the pump is controlled by the automatic engine operation system and the electrical supply comes via the DEI-NT. The electrical fuel pump cares for engine fuel supply as long as the membrane pump is not able to do so. During engine operation, the electrical fuel pump is automatically switched off as soon as engine RPM exceeds 4900 rpm for more than 10 seconds.

When the DEI-NT fuel pump switch is in “ON” position, the pump runs as soon as the master switch is “ON” (Continuous operation). Electrical supply in this case via the control unit.

Pump feed performance is being checked by fuel flow. Open fuel supply line below the carburettor branch and place tube end into a metering bowl. Switch pump “ON” and measure time for 1 litre <61 cu. in>. Maximum time allowed is 130 seconds.

**Mechanical fuel pump:** The mechanical fuel pump at the left side of the engine mount below the engine is driven by the vacuum pulses from the engine crankcase and operates only when the engine runs.

An excess fuel line with built in restriction which runs back to the feeder tank diverges near the carburettors.

The excess fuel line limits the fuel pressure at the carburettors.



### 3.5 Engine Maintenance (continued)

#### 3.5.1 25 hours Inspection (continued)

##### Electrical system

26. Proximity switch: Check attachment at bracket and connection to engine housing for tight fit and cracks. Check sensor gap adjustment: for value see section 1.12.13.

27. Check cables and electrical connections at engine. Check cable terminals for cracks.

**Note:** Critical places may be covered by heat-shrink sleeves and must be cautiously freed. After inspection, re-fit new heat shrink sleeves ( see section 4.15 for instructions).

28. Check total electrical system for chafing, tight fit of all connectors and screw joints and general condition. Check function of all automatic circuit breakers and condition of fuses (see section 1.12.11).

##### Fuel tanks

29. Visual inspection of tanks for damage and leaks.

30. Check fuel level sensors:

- Empty tank as described under item 11 either using fuel pump or drain valve until reserve sensor switches and DEI-NT shows reserve level. (see Flight Manual Section 7.12.3.4) Check level at feeder tank visually.
- Top up using electrical re-fuelling system until tank full sensor switches and DEI-NT displays maximum possible fuel level (see Flight Manual Section 4.5.2). Check level at main tank visually.

##### Test run, Adjustment of maintenance timer

31. Perform engine test run.

**Warning:** Engine test runs should normally be performed in flight. Whenever a ground run is required, never test with wings not rigged!  
For details of test run procedure see section 4.10.

32. Reset DEI-NT maintenance timer (see Flight Manual Section 7.12.2.2)

## 4.6 Installation of Gap Sealing

### 4.6.1 Installation of gap sealing at ailerons

- (1) Place wing vertically on padded supports with leading edge downward and secure at spar tongue or fork against toppling over.
- (2) Cut Teflon tape to ample aileron length and cover one edge with Tesafix 4965 adhesive strip (9mm wide) without pretension to avoid warping.
- (3) Clean bonding region on wing after aileron removal from adhesive residues (eg. sandpaper 60 grit) and brush thinly with contact glue
- (4) After approximately half an hour of drying, place inner Teflon sealing tapes to wing according to sketch such, that about 2 mm (0.08 in) at the edge are not covered. Remove masking from sealing tape during bonding process.
- (5) Place aileron into bearings provisionally, deflect fully and mark rear wing edge position on aileron using a pencil for both deflections.
- (6) Bond adhesive strip to aileron such that its leading edge is at least 5 mm (0.197 in) in front of marking. Also at bearing cut-outs a minimum of 5°mm (0.197 in) must remain.
- (7) Install aileron completely, see section 4.5. Remove masking tape from aileron bonding strip and press Teflon tape on without undue pulling or warp. Cut surplus Teflon tape along wing rear edge marking (or edge 5mm behind bearing cut-out), but avoid cutting into gel coat.

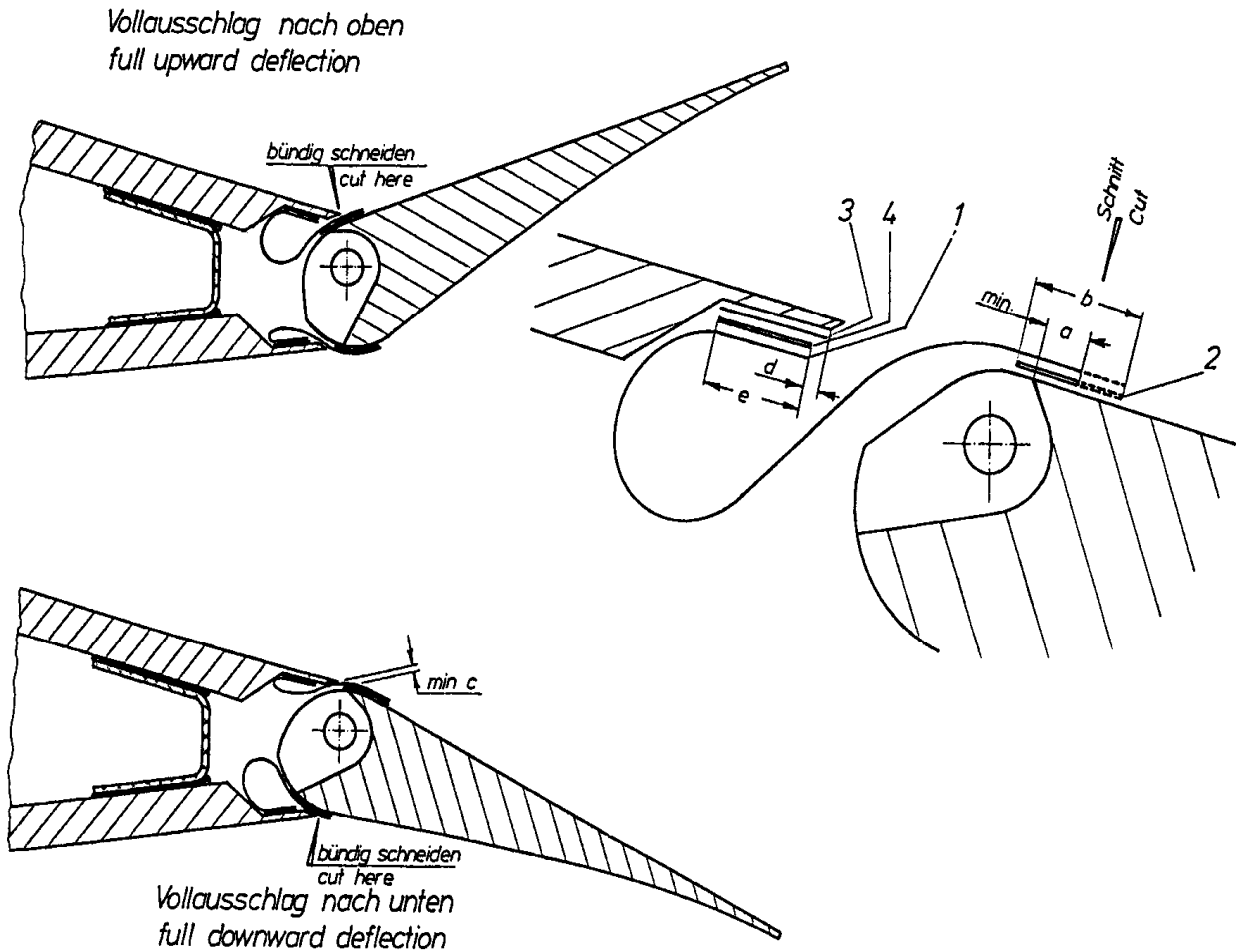
4.6.1 Installation of gap sealing at ailerons (continued)

Material (see parts list section 9):

No.	Denomination	Required
1	Teflon-Glass tape 0.1*50mm <0.004*1.97 in>	15.2m <50 ft>
2	Bonding film Tesafix 4965 translucent 9 mm <0.35 in>	15.2m <50 ft>
3	Contact adhesive (Pattex)	
4	Bonding film Tesafix 4965 translucent 9 mm <0.35 in>	15.2m <50 ft>

Measurements:

a	5 mm <0.197 in>
b	12 mm <0.472 in>
c	minimum 1 mm <0.039 in>
d	2 mm <0.079 in>
e	9 mm <0.354 in>



#### 4.9 Cleaning of Decompression Valves (continued)

Cleaning of deco valves:

(see also section 10, diagram 8)

- (1) Remove deco operating lever with roller.
- (2) Remove deco bridge <2> between both valves (width over flats 9 mm, watch out for small washer, spacer, large washer and spring)
- (3) Remove deco valves <1> (width over flats 19 mm) and clean:
- (4) Decarbonize valves using petrol and fine steel brush. Rod must move freely, if need be disassemble valve after removal of retaining ring.
- (5) For re-installation use new sealing washer and torque 20 Nm (2.04 mkg; <14.75 ft lb>)
- (6) Check for tightness:
- (7) No hissing noise allowed when turning propeller by hand. If need be, exchange complete deco valve (see parts list section 9).
- (8) Lateral stiffening angle of deco bridge <2> must be on left side, assembly sequence: spring, large washer, spacer, bridge, small washer, „Thermag“-nut <5> M6 (width over flats 9 mm)
- (9) Check play between deco bridge <2> and operating roller <4>, see section 1.9.7.

#### 4.10 Engine Ground Run

Starting engine on ground is possible only with suitable external starter motor. For this purpose the central propeller bolt has a hexagon head for connecting the external starter motor (see Flight Manual pictures section 4.3).

**Warning:** This starting procedure is explicitly not recommended, because the procedure requires a lot of care and wariness to exclude danger.  
Whenever possible test engine run in flight.  
Never do a ground run with wings not rigged.

Secure plane on movable jack using rope or webbing straps used in roller blinds against tree, braked vehicle etc.

External starter motor: 2 people are required, use for instance angle grinder with threaded pivot bolt, RPM range 750-3000 RPM (e.g. Bosch GPO 12 E), turning in clockwise direction (view from the front on the engine). Connect with long 16 mm socket on central propeller bolt. Make sure that the wire can't interfere with the propeller.

Helper at cockpit operates Deco valve lever:

1. Extend engine completely.
2. Fuel cock "OPEN" and ignition "ON".
3. Deco-lever "OPEN"
4. Place angle grinder on central bolt and start.
5. After short run driven externally, "CLOSE" deco lever.

Pull external drive away from propeller, engine rpm increases, read rpm from DEI-NT, which should be between 4600 to 4800 rpm. A cold engine turns slightly quicker (about 100 rpm), this comes back down after about 5 minutes.

When the engine does not start or is reluctant to do so, check deco valves for proper closing: No hissing noise allowed when turning by hand.

## 4.14 Exchange of Cables

### Control cables and connections

For processing Nicopress sleeves refer to FAA "Aircraft Inspection and Repair" FAA AC 43.13-1 A or later issue

#### 1. Rudder cables and engine retaining cable connection to engine

Cable: B 3.2 MIL-W-83420 I/A resp. ISO 2020  
(former LN 9374) zinc plated

Steel thimbles: A 3.5 DIN 6899

Cable sleeves: Nicopress NT 283M (28-3-M), 3 pressings required, with tool groove Oval M

Stop sleeve: Nicopress NT S117J (871-18-J), use tool groove "J" of tool 51-MJ, 1-press

#### 2. Tow hook operation and wheel brake

Cable: A 2.4 MIL-W-83420 I/A resp. ISO 2020 (former LN 9374)  
A 2.4 LN 9389 corrosion resistant (C.G. hook)  
2.5 DIN3055 corrosion resistant with steel core (C.G. hook)

Steel thimbles: A 2.5 DIN 6899

Cable sleeves: Nicopress NT 282GA (28-2-G), for pressing use tool groove Oval G of tool 64-CGMP. 1 press

Stop sleeve: Nicopress NT S117J (871-17-J), use tool groove "J" of tool 51-MJ 1-press (see note under 1.)

#### 3. Tail tank

Cable: 1.2 mm LN 9389 corrosion resistant

Steel thimble: A 1.7 DIN 6899

Stop sleeve: Nicopress NT S117J (871-17-J), for pressing use

**a. groove "J"** of tool 51-MJ, **thereafter**

**b. groove "G"** of tool 64-CGMP, 1 press each in given sequence

#### 4. Deco valve

Cable: 1,6 mm 7x7 MIL W 83420

Steel thimble: 2,0 mm HC2

Cable sleeves: Nicopress NT 281CA (28-1-C), for pressing use groove "C" of tool 64-CGMP. 1 press.

#### 5. Engine retaining cable

a) Connection to engine: see 1.

b) Connection retaining cable to bungee: Nicopress NT 284P (28-4-P), Use 64-CGMP groove P.

c) Stop sleeve: Nicopress NT S118J (871-18-J), use tool groove "J" of tool 51-MJ, 1-press

**6. Instruments- and Equipment List (Master Equipment List)**

**Maximum mass of all Instrument Panel Installations max. 6.7 kg <14.8 lbs>.**

**6.1 Airspeed Indicator**

<b>Manufacturer</b>	<b>Type</b>	<b>TCDS No.</b>
Winter	<u>6FMS-4</u> (Diameter 80mm) 0-300 km/h Art.No. 6421-499 0-160 kts Art.No. 6423-499 <u>6FMS-5</u> in km/h <u>7FMS-42</u>	TS 10.210/15
Winter	<u>7FMS-4</u> (Diameter 58mm) 0-300 km/h Art.No. 7421-499 0-160 kts Art.No. 7423-499 <u>6FMS-5</u> in km/h <u>7FMS-42</u>	TS 10.210/19
Thommen	<u>5A58()</u> range 300 km/h	
PZL	<u>PR-400 S-A</u> in km/h	

or other Airspeed indicators approved according to TSO, JTSO or ETSO for use in aircraft or similar FAA approved airspeed indicators to meet TSO C2 reading to 300 km/h <160 Kt., 180 mph> may be used. Maximum instrument error  $\pm 2\%$ . Colour marking must be according to Flight Manual section 2-3.

**6.2 Altimeter**

<b>Manufacturer</b>	<b>Type</b>	<b>TCDS No.</b>
Winter	<u>4 FGH 10</u> (Diameter 80mm) 1000-10000m Art.No. 4110 3000-30000ft Art.No. 4330	TS 10.220/46
Winter	<u>4 FGH 20</u> (Diameter 58mm) 1000-10000m Art.No. 4220	TS 10.220/47
Winter	<u>4 FGH 20</u> (Diameter 58mm) 1000-20000ft Art.No. 4550	TS 10.220/48
PZL	W-12S in m	

or other Altimeters approved according to TSO, JTSO or ETSO for use in aircraft; one turn of dial max. 1000 m or 3000 ft. A similar FAA approved altimeter to meet TSO C10 with a range of approximately 33000 ft and a mercury or millibar or hektopascal subscale may be used. When an altimeter of up to 20000 ft only is being used, a placard must be near the altimeter stating: Maximum flying altitude 20000 ft. See also Flight Manual section 2.12.

**6.3 Seat Belt Harness (with multiple point buckles)**

<b>Manufacturer</b>	<b>Type</b>	<b>TCDS No.</b>
Schroth	4-01-0.104 (Lap belt and shoulder strap)	40.073/11
Gadringer	Lap belt 5202 Shoulder strap 2700	40.070/32 40.071/05

**6.4 Compass**

<b>Manufacturer</b>	<b>Type</b>	<b>TCDS No.</b>
Ludolph	FK 16, FK 5, FK 10	10.410/3
Airpath	C 2300, C 2400	TS 10.220/47
PZL	BS1, KJ-13A	FD 19/77
Bohli	46 MFK 1	Not approved, only as additional system

**6.5 VHF transceiver**

<b>Manufacturer</b>	<b>Type</b>	<b>Certification No.</b>
Dittel	FSG-40 S	10.911/45
	FSG-50	10.911/71
	FSG-60 M	10.911/72
	FSG-70,71 M	10.911/81
	FSG-90	0.911/98JTSO
	FSG 2T	LBA.0.10.911/103JTSO
Becker	AR 3201-(1)	10.911/76
	AR 2008/25 (A)	10.911/48
	AR 4201	JTSO-2C37 D, ED-23A
	AR 6201	EASA.210.1249
Filser/Funkwerk	ATR 720 A	10.911/74
	ATR 720 C	10.911/83
	ATR 600	O.10.911/106JTSO
	ATR 500	LBA.0.10.911/113JTSO
	ATR 833	EASA.210.0193

or other radios approved according to TSO, JTSO or ETSO for use in aircraft.



## **9. Parts List**

In this list, the most important parts of propulsion system, electrical system as well as components of control surface sealing and water ballast system are provided.

For drawing numbers of control system parts refer to diagrams section 1. For drawing numbers of propulsion system brackets refer to diagrams section 10.

### **9.1 Engine parts**

#### **a) necessary for the 25 hours inspection**

- 40050360 Spark plug S36 (Bosch W5AC Electrode gap 0,5 mm <0,02 in>) with pressed on screw cap, marked by red dot on insulator.
- 60507571 Fuel filter

#### **b) Spare parts**

- 45002085 Spark plug cap Denso, 5kOhm
- 60510601 Ignition coil for SOLO 2350
- 45002081 Exhaust gasket, 1.5mm thick (2 units required)
- 45002071 Decompression valve (2 units installed)
- 45002088 Lift cylinder for LS8-t, HG7000-12-225-30, modified
- 45002038 Gas strut 600N for extension-retraction mechanism
- 45002039 Gas strut 100N for propeller stopper
- 45002074 Propeller stopper rubber stop

#### **Shock mounts for engine installation**

- 45002079 Upper engine shock mounts (2 units installed)
- 45002080 Lower engine shock mounts (2 units installed)

#### **Fuel system**

- 60507608 Fuel quick connector KL-006-2-SL007  
(Coupling for re-fuelling line)
- 60507550 Drainer CAV 110 (1/8" NPT)

**Caution:** Exchange O-ring (Avgas type) as delivered with drain valve against part No. 60504402 !

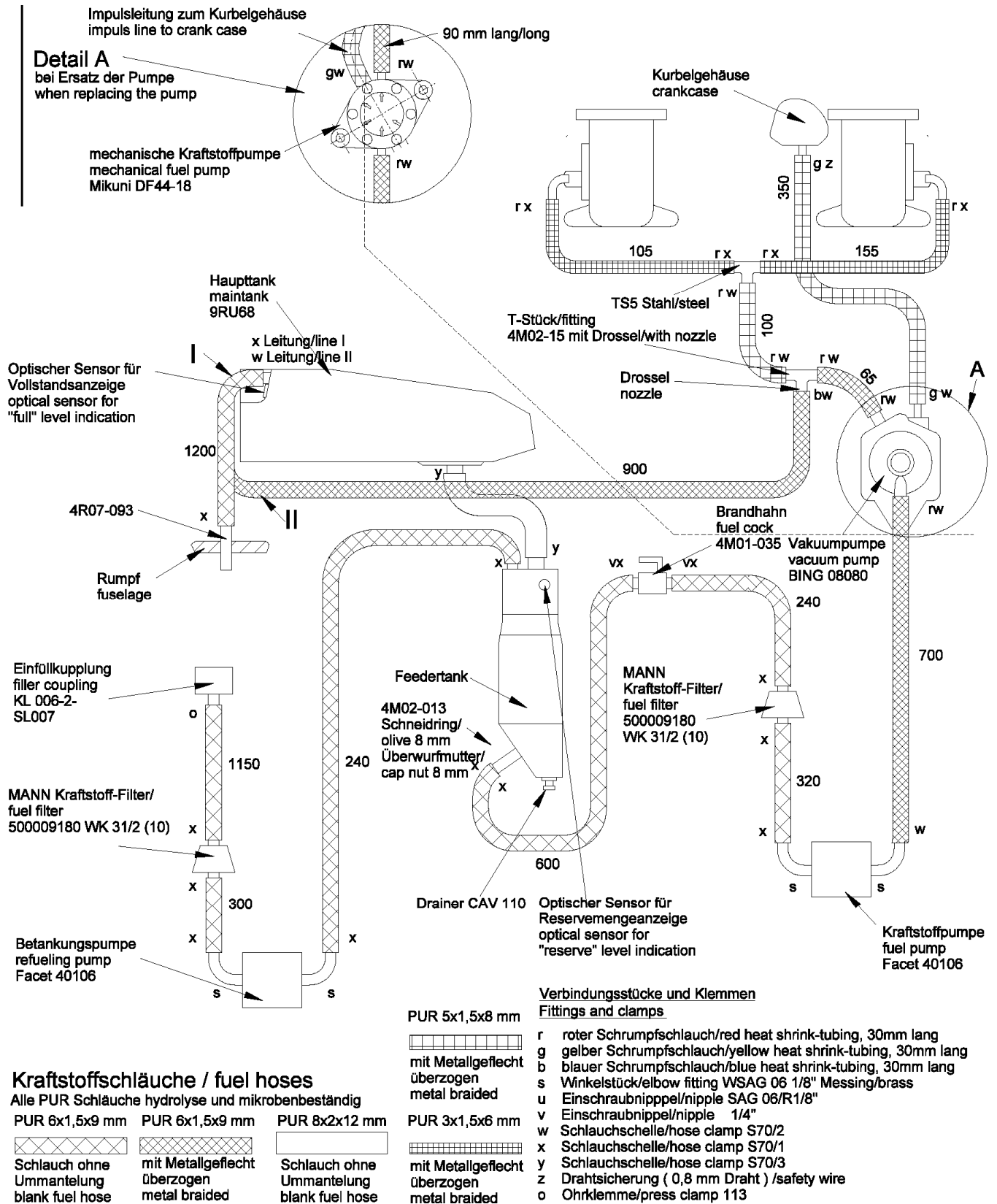
- 60504402 O-Ring for Drainer CAV 110 (Mogas type)
- 30092049 Fuel hose PUR 3x1,5x6mm hydrolyse and microbe-resistant
- 30092050 Fuel hose PUR 5x1,5x8mm hydrolyse and microbe-resistant
- 60000103 Fuel hose PUR 6x1,5x9 hydrolyse and microbe-resistant
- 60000102 Fuel hose PUR 8x2x12 hydrolyse and microbe-resistant
- 30092051 Metal mesh inner dia. 8 mm (for fuel lines)
- 60507561 Electric fuel pump Facet 40106 (engine fed and re-fuelling)
- 60500164 Mechanical fuel pump Bing 8080 (no more available)
- 60500257 Mechanical fuel pump Mikuni DF44-18 from ser. no. T57 on and as spare part (for installation follow TN 8022)
- 45000162 Fuel cock 4M1-034

#### **Propeller attachment**

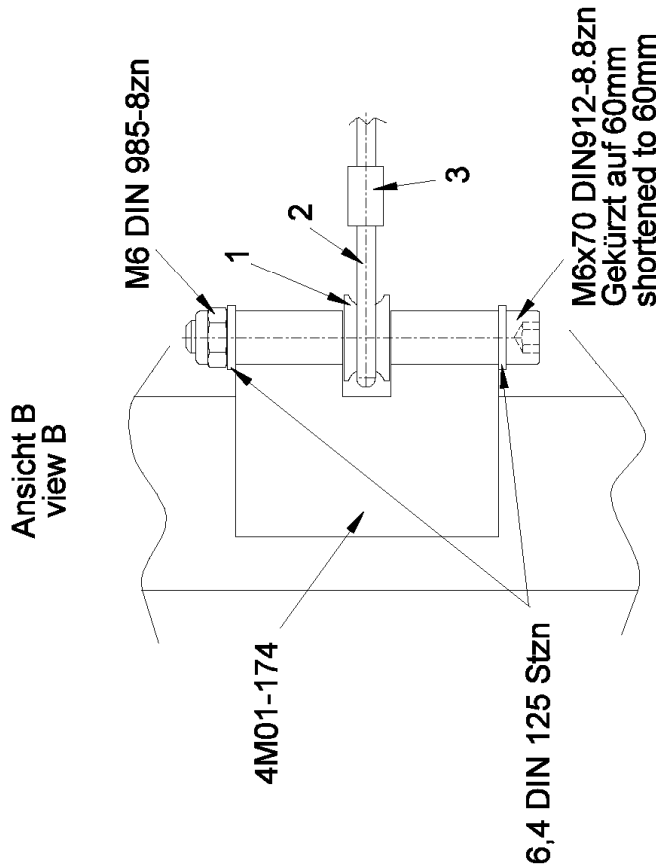
- 45002052 Rubber stop for propeller



Diagram 2a: Fuel system Ser.no. 8474 and from ser.no. 8529 on (ÄM LS8-1)



Rückhalteseil (Triebwerk ausgefahren)  
Retaining cable (engine extended)



- 1 Aufmermerolle Rückhalteseil 4M01-161 / Bushing for retaining cable 4M01-161
- 2 Kausche / thimble 3,5mm
- 3 Nicopress Klemme NT 283M (28-3-M), Vertiefung M / Nicopress Sleeve NT 283M (28-3-M), press with groove M
- 4 Schlauchschelle (tube clamp) 8-12mm
- 5 50mm Instrumentenschlauch mit Schrumpfschlauch / 50mm instrument tubing with shrink tube
- 6 Sicherungsblech Rückhalteseil 4M01-171 / Securing plate retaining cable 4M01-171
- 7 Drahtsicherung / Safety wire
- 8 Mutter (nut) M12 DIN 439 A2
- 9 Rückhalteseil Durchführung 4M01-022 / Retaining cable guide 4M01-022
- 10 Motorkasten / Engine bay
- 11 4M01-023
- 12 Polyethylen Rohr (tube) 17x2
- 13 Nicopress Klemme NT S117J (871-17-J), Vertiefung J, Werkzeug 51-MJ / Nicopress sleeve NT S117J (871-17-J), press with groove M, press tool 51-MJ
- 14 Nicopress Klemme NT 284P (28-4-P), Vertiefung P, Werkzeug 64-CGMP / Nicopress sleeve NT 284P (28-4-P), press with groove P, press tool 64-CGMP
- 15 Gummiseil mit 5mm Überstand, Stahlseil bündig / Bungee 5mm sticking out, steel cable plain with clamp
- 16 Gummiseil Ø 6mm / Bungee Ø 6mm
- 17 Spornradkasten / Tailwheel box
- 18 Scheibe / washer 8,4 DIN9021-Stzn
- 19 Scheibe / washer 6,4 DIN125-Stzn
- 20 Knoten (3 halbe Schläge) letzten Schlag mit Sekundenkleber sichern / Knot (3 half knots) secure last half with instant glue
- 21 GFK Befestigung zur Rumpfschale / GFRP fixation to fuselage shell

