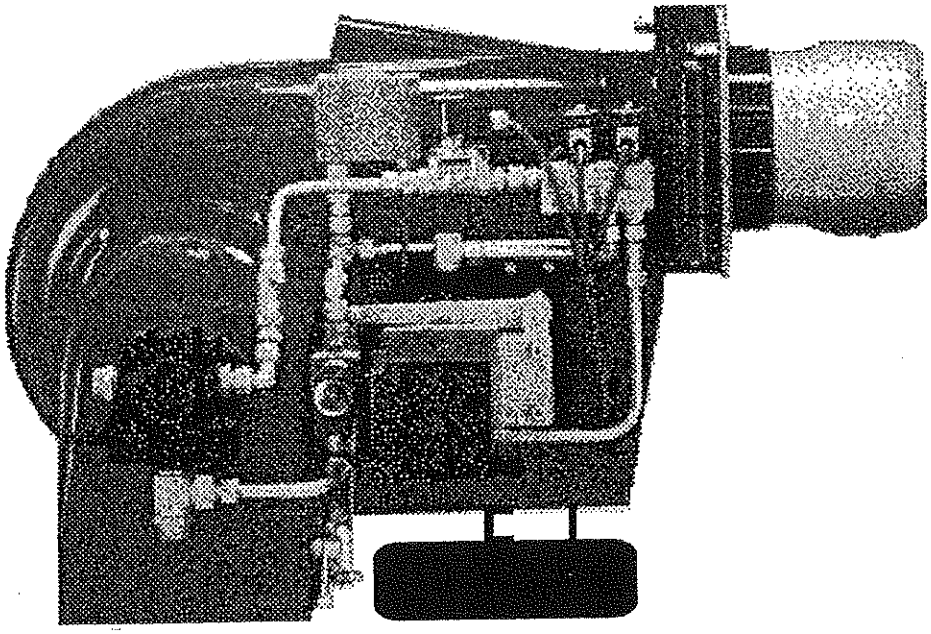
INSTRUCTION MANUAL
for
OILBURNER TYPE RMS 9
AND CONTROL PANEL

Customer : Kvaerner Warnow Werft, Germany

Newb. No. : 027
Project No. : 01 – 735216
Date. : Aug. 2001

MODULATING OIL MONARCH

RMS BURNER



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1.0 Technical data sheet and specification.

1.1 Technical data sheet.

1.2 Burner specification.

1.3 Description and operating instruction.

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1.1 Technical data sheet.

Project No.	: 00 + 735214/16
Customer	: Kvaerner Warnow Werft, Germany
Newb. No.	: 026/27
Oil Burner type	: RMS 9
Boiler type	: TO - 1
Date	: Aug. 2001
Made by	: HCh / 200

1) Boiler type	: TO - 1
2) Heating capacity	: 1800 kW
3) Effeciency	: 86 %
4) Outlet flow temperature (design)	: 195 deg. C
5) Outlet flow temperature (MIN)	: 195 deg. C
6) Outlet flow temperature (MAX)	: 200 deg. C
7) Max. permessible working pressure	: 10 Bar
8) Medium	: Fluid oil
9) Circulation quantity	: 76 m^3 / h
10) High excl. Burner	: 3840 mm
11) Diameter incl. of insulation	: 1970 mm
12) Weight excl. of themal fluid	: appr. 5400 kg.
13) Weight incl. of thermal fluid	: appr. 6400 kg.
14) Air temp.	: 40 deg. C
15) Gas exit temp.	: appr. 380 deg. C
16) Flue gas flow	: appr. 3350 kg / h
17) Oilburner capacity MIN / MAX	: 80 / 239 kg / h
18) Fuel oil viscosity	: 6000 sec. R. No. 1 at 100 deg. C
19) Electric power source	: 3 x 440 v 60 Hz
20) Electric control source	: 1 x 220 v 60 Hz
21) El - power consumption at full load	: appr. 52 kW
22) Flame tube / Oilnozzle	: M9 / 1a - 165 x 50 / W 250

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1.2 Burner specification.

The burner type is a pressure atomizing burner with one nozzle for modulating operation provided for heavy oil up to 6000 sec. Redwood No. 1 at 100^0F and diesel oil.

The burner housing is mounted on the boiler front on side hinges so that the burner can be swung to either side depending on conditions as for instance position of fittings, pipes or bulkhead.

A cover for inspection and cleaning of air duct is fitted on top of the house. On the left side is fitted a cover, behind which the electric terminals and ignition transformer are located.

Further, a switch blocking the start sequence, if the burner is swung out, it is fitted in the front edge of the burner housing.

Fan motor is fitted on the side of the housing and connected to the fan wheel directly and the oil pump via a coupling.

The air is sucked through an intake, in which two dampers are provided.

Oil pump is a gear-wheel pump provided for a pressure up to 30 bar with oil temperature of fuel oil at max. 90^0 C.

The pump has built-in pressure regulator and filter.

Servo motor or damper-motor sets the air quantity in proportion to the oil quantity fired. The adjustment is made by means of a motor driven cam-shaft on which six cam switches are placed activating some switches.

Adjustment of final position is made after measuring of CO% and soot spot of smoke gas.

Oil pipe to burner is always made of flexible hoses from gas/air separator in the oil ring main circulation pipe to the pump (to make it possible to swing out the burner on its hinges).

Nozzle head is a so called re-circulation body, i.e. that the oil is circulating all the way up to the nozzle, so that it always has the right temperaturew for safe ignition.

Solenoid valves:

NORMALLY OPEN (NO).
NORMALLY CLOSED (NC) and safety oil-off valves.

The last mentioned valves is to close for the oil to the nozzle solenoids, when the burner is stopped.

Oil circulation takes place by means of the pump through oil preheater to burner body and back through NO solenoid valve for Nozzle 1.

Oil preheater is electrically heated.

El-heating units is necessary at various places in the system, especially if the plant is running with long stand-by periods or in case the oil is heavy fuel. Heating cartridges is mounted in the burner body - and in a heating block for solenoid valves as well as at the bottom of the filter.

Heating tracing of the oil pipe can be provided as el-heating cables or with metal pipes for steam.

Gas/air separator is mounted in circulation pipe to avoid gas/air pockets in the oil, are led the pump and nozzles.

Nozzles is of spill type.

Burner management.

LOK 16 is a control box for the burner. It is operating by a motor driving cam shaft by, which some switches are activated in a rated order. These switches are further controlling various components as servomotor, solenoid valves, burner motor, ignitions and flame control.

Flame control by means of a photo-cell named RAR 7 inserted in the left side of the burner housing facing the flame.

REMEMBER that the photo-cell is polarized.

Diffuser or air guide vane is placed in front of the nozzles and with the purpose of mixing air and oil mist to a suitable mixture. Further, the shape and length of the flame is determined by the mutual relationship among nozzles, diffuser disk and combustion head.

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Themostates and temperature transmitter are fitted on a plate on the boiler and have varius functions whitin the burner automatic.

The thermostates are set in accordance with the working temperature and load of the boiler.

The temperature transmitter takes care of the modulating of the burner.

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1.3 Description and operating instruction.

Working operation of the burner:

From the oil tank, the oil is led through the suction pipe, the filter and through the connection hose into the oil pump, where the necessary atomization pressure is built up.
The oil pressure, which is to be read on the pressure gauge, can be adjusted by the built-in pressure regulating valve.
From the oil pump, the oil is forced through a safety solenoid valve, which is open, when the burner is running and then through the electrical oil preheater, where the oil is preheated to the desired temperature suitable for proper atomization.
From the preheater the oil goes to the nozzle head, where the nozzle is placed, it is a recirculating nozzle head. When starting the burner, the oil is forced by the automatic to circulate through the nozzle head before being ignited to encure, that oil with the right temperature is availabble.
This period is called the prepurge-time, because in the same time the furnace is ventilated.
After this period the magnet valves is activated.
The necessary quantity of air for the combustion is forced into the burner by the built-on fan wheel, the quantity is regulated by the damper. The air damper connected by rod so that that they are operated in parallel by the servomotor.
The servomotor is also connected to an oil regulator valve, which reduces the oil return quantity and increases the nozzle throughput.

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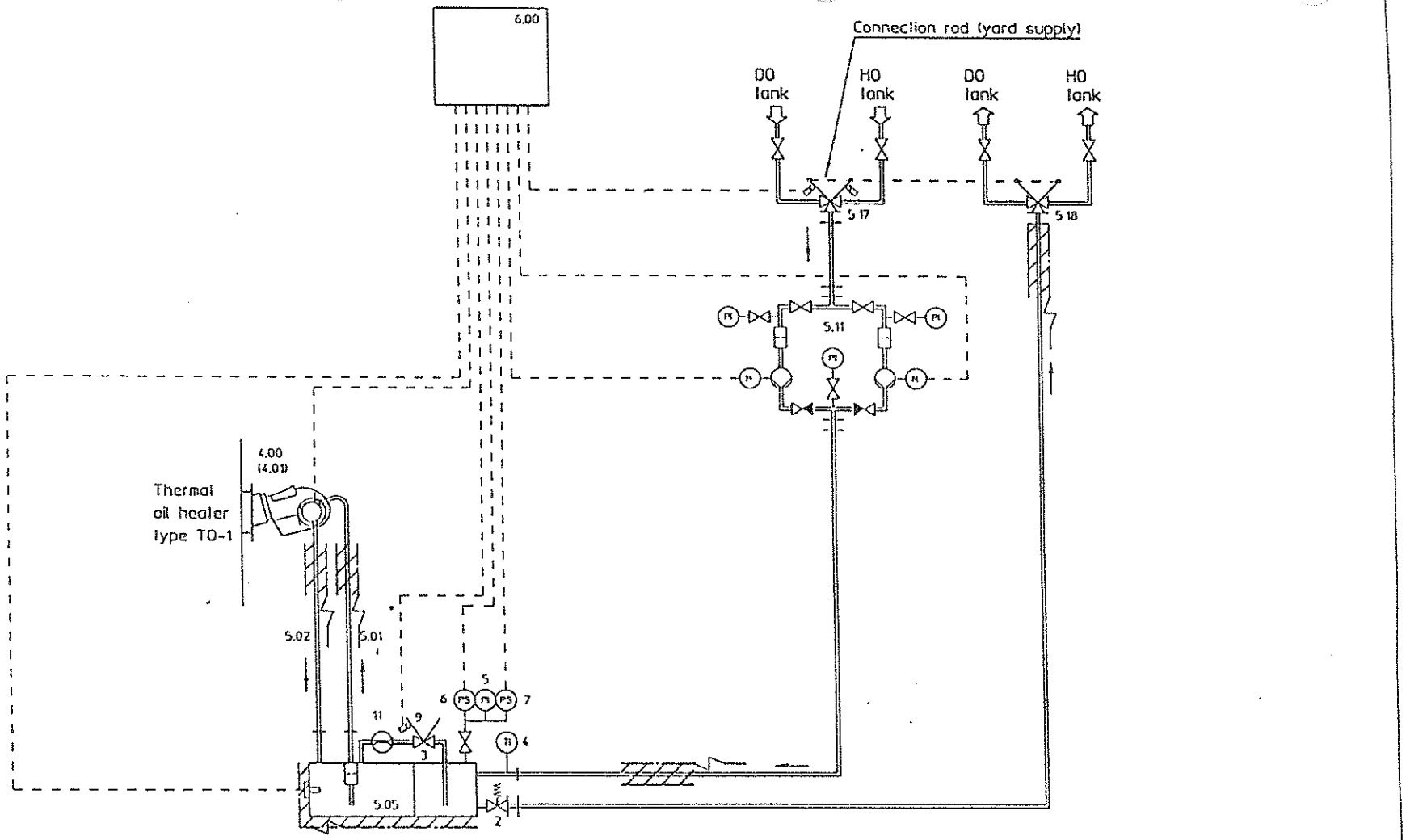
2.0 Oil System.

2.1.0	M: 136322	Flow diagram
2.1.1		List of parts for flow diagram
2.1.2		Burner fuel system
2.2.0	B: 3003.0	Gas/air separator
2.3.0	B: 3106.0	Single filter
2.4.0	B: 3007.0	Oil transfer pump unit
2.4.1		Technical data for oil pump unit
2.4.2		Operating and Maintenance Instruction
2.5.0	B: 3102.0	Pressure regulating valve
2.6.0	B: 3062.0	Quick closing valve
2.7.0		Instruction for Oil Flow Meter
2.8.0	B: 3035.0	Strainer for flow meter
2.9.0	B: 3055.0	By - pass valve
2.10.0	B: 3070.0	Three - way valve
2.11.0	B: 3010.0	Thermometer
2.12.0	B: 3104.0	Pressure gauge



Signatures:

- Oil
- External wiring
- Tracing
- Insulation
- Flange

NOTE:
Components specified by item no. are supplied by AS
Items: see separate part list
The distance between item 5.05 and 4.00 to be max. 0.5m
The oil pressure in item 5.05 min. 1.0 bar, max. 4.0 bar

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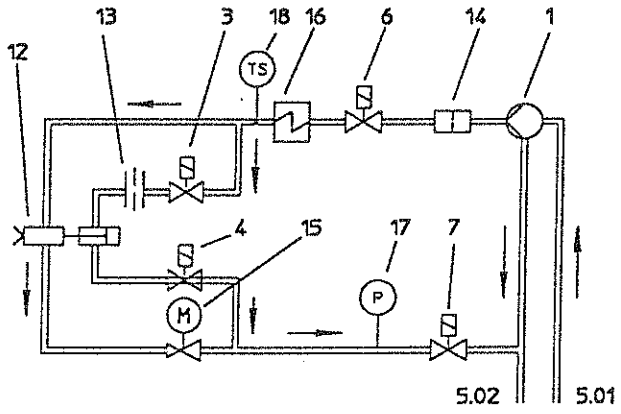
Title:
Flow diagram for oil burner
Burning diesel/heavy oil
Project no.:

Drawn	ISk	980109
Appr.		
Scale:	-	-

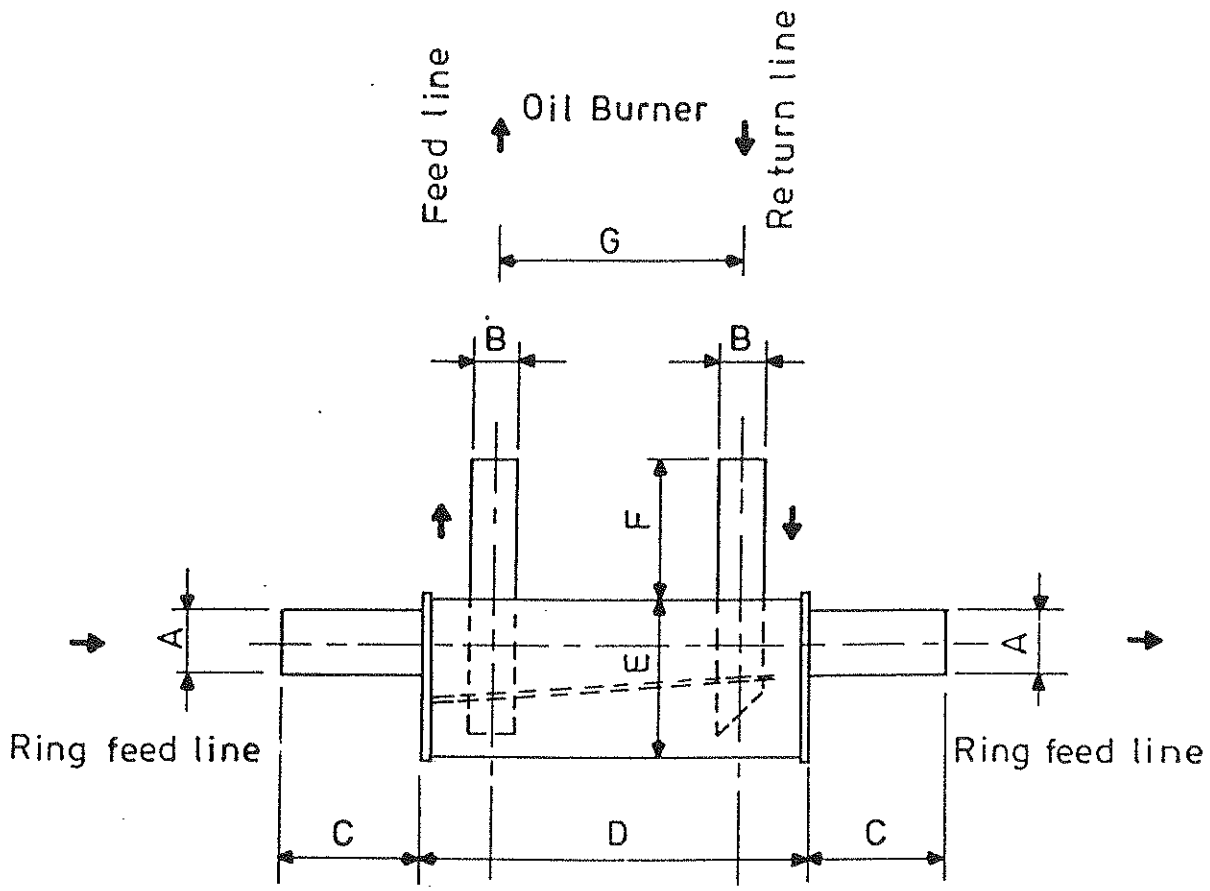
Drawing No:
M:136322

List of Parts for Oil Fired Boiler Type TO-1 "Flow Diagram for Oil Burner", Drawing No.: M:136322				Rev: Date:	Class.: GL
Item No	Qty		Description	Applications	Data Sheet or Drawing
4.00	1		Oil burner		B.3009
4.01	1		Schematic diagram on burner		Item 4.01
5.01	1		Flexible oil hose inlet	Incl. el-tracing	
5.02	1		Flexible oil hose outlet	Incl. el-tracing	
	1		Filter	AKO	Build on item 5.05
	1		Quick-closing valve	With micro switch	Build on item 5.05
5.05	1		Gas/air separator unit		81Y:003384
	1		Pressure regulating valve		Build on item 5.05
	3		Needle valve		Build on item 5.05
	1		Pressure gauge	0-6 bar - 3/8"BSP	Build on item 5.05
	1		Pressure switch for low oil pressure		Build on item 5.05
	1		Pressure switch for aut. stand-by		Build on item 5.05
5.11	1		Oil transfer pump unit		B.3007
	1		Thermometer		Build on item 5.05
	1		Flow meter		Build on item 5.05
5.17	1		Three-way ball valve	Incl. micro switches	B.3070
5.18	1		Three-way ball valve	Excl. micro switches	B.3070



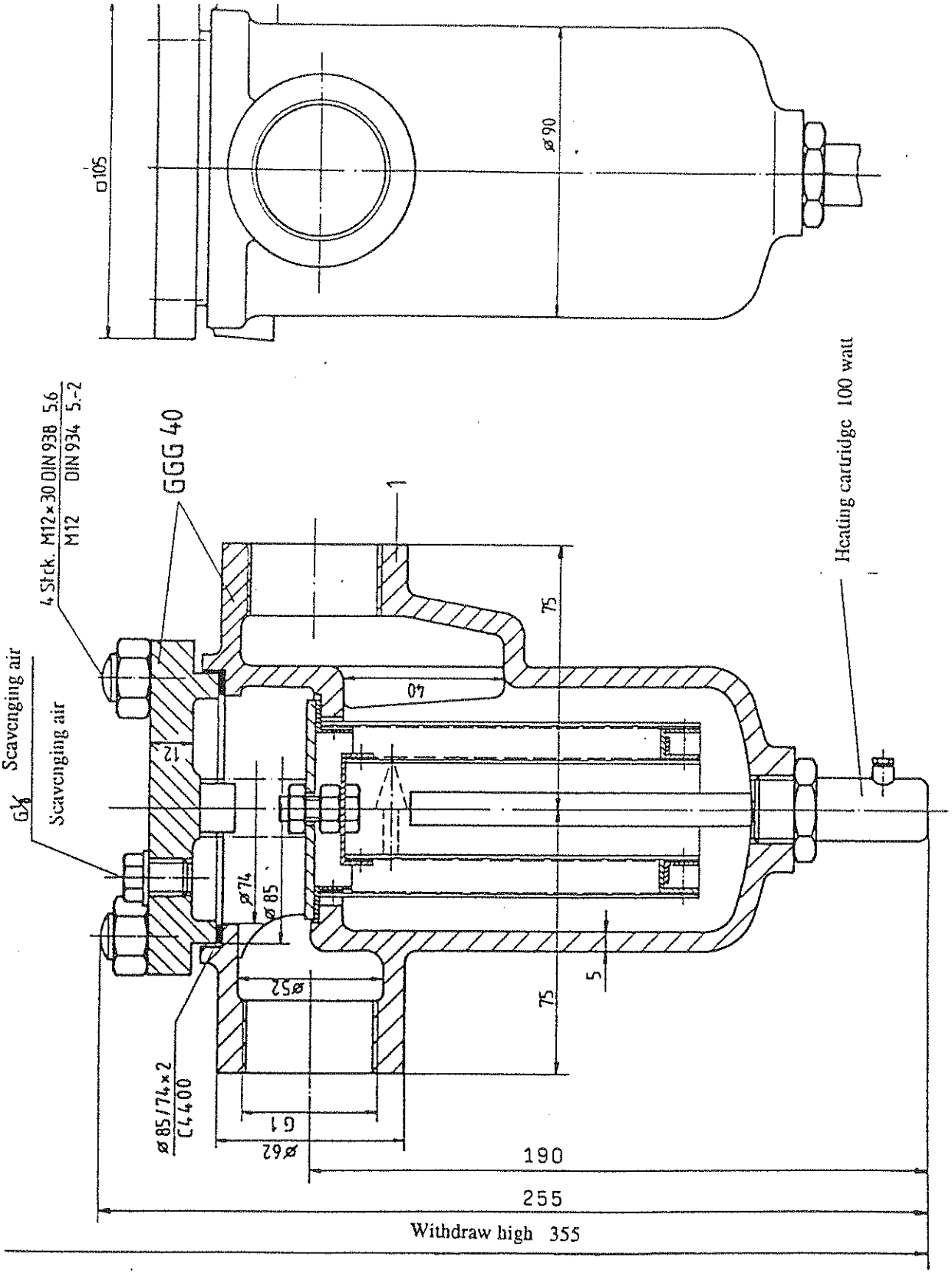
Item	Description
1	Pump without solenoid valve
3	Solenoid valve (normally closed)
4	Solenoid valve (normally open)
6	Solenoid valve (normally closed)
7	Solenoid valve (normally closed)

Item	Description
12	Nozzle head
13	Restricting orifice
14	Filter
15	Oil regulator
16	Oil preheater
17	Pressure switch
18	Temperature switch



Return line and feed line facing vertical upward

The used one	NW No.	A	B	C	D	E	F	G
	1	33,7 (1")	33,7 (1")	104	237	76,1	100	150
➢	2	48,3 (1,5")	33,7 (1")	100	278	108,0	100	180
	3	60,3 (2")	42,4 (1,25")	100	400	177,8	100	250



Permiss. service overpressure	: 16 Bar
Test overpressure	: 24 Bar
Medium	: DO / HFO
Pot capacity	: 0,75 liter
Net weight	: 5,0 kg

drawn by HCH 330	date DATE 5/11 96	rev 0	date	

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SINGLE FILTER

Data Sheet
B: 3106.0

Beschreibung und Betriebsanleitung für AKO-Einfachfilter

Der Filter besteht aus dem zylindrischen Gehäuse mit abnehmbarem Deckel und einem Filtereinsatz. Der Filter besitzt einen Entlüftungs- und Entleerungsanschluß, sowie Anschlüsse für ein Sicherheitsventil und Heizmediumeinleitung.

Die Rohrleitungen sind spannungsfrei anzuschließen. Es ist darauf zu achten, daß die Flüssigkeit in Pfeilrichtung durch den Filter strömt. Bei Inbetriebnahme ist der Filter zu entlüften.

Die Filtrierung erfolgt im Filtereinsatz, der von innen nach außen durchströmt wird. Die Schmutzteilchen werden im Einsatz zurückgehalten. Das Filtergehäuse bleibt sauber. Der Filtereinsatz ist bei einem Differenzdruck von ca. 0,7 bar zu reinigen. Nach Abnehmen des Deckels läßt sich der verschmutzte Siebeinsatz leicht nach oben herausnehmen.

Die Reinigung erfolgt durch Ausblasen mit Druckluft, Dampf oder Wasser bzw. durch Ausbürsten mit einer weichen Bürste. Dabei ist darauf zu achten, daß das Filtergewebe nicht beschädigt wird und beim Ausblasen nicht nach innen gedrückt wird. Bei festsitzenden Schmutzablagerungen muß der Einsatz vorher mit einem geeigneten Lösungsmittel behandelt werden.

Der Filtereinsatz ist für einen max. Differenzdruck von 1 bar zugelassen, für höhere Differenzdrücke sind Sondereinsätze erforderlich. Um die rechtzeitige Reinigung und Einhaltung des max. zulässigen Differenzdruckes sicherzustellen, empfehlen wir den Einbau unseres Verschmutzungsanzeigers.

Bei beschichteten Filtergehäusen ist darauf zu achten, daß die Beschichtung nicht beschädigt wird.

Wir haften nicht für Schäden, die durch unsachgemäße Bedienung entstehen.

Description and service instructions for AKO-Single Housing Filter

The filter consists of the cylindrical housing with removable cover and one filter basket. The filter has an air outlet and a drain connection, and also connections for a security valve and flow of heating medium.

The pipe lines have to be connected without tension. It is essential that the flow direction corresponds with the arrow on the filter housing. When starting, the filter has to be deaerated.

Filtration takes place in filter basket, which is flown through from inside to outside. The dirt particles are retained in the basket, the filter housing remains clean. The filter basket has to be cleaned at a differential pressure of about 0,7 bar. After removal of cover, the basket can be lifted easily in vertical direction.

Cleaning is done by blowing out with compressed air, steam of water or by brushing with a soft brush. Take care that the filter cloth will not be damaged and that the cloth will not be pressed inside in case of blowing out. In case of sticking deposits of dirt, the basket should be treated beforehand with an adequate solvent.

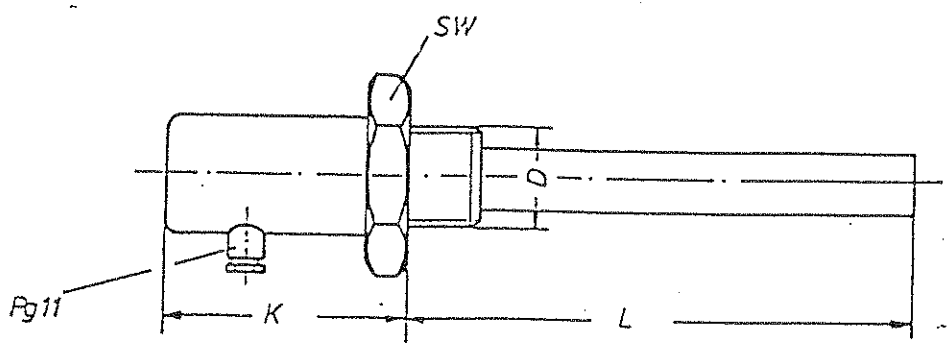
The filter basket is permitted for a max. differential pressure of 1 bar — for higher differential pressures special baskets are required. In order to ensure punctual cleaning and observance of the max. admissible differential pressure, we recommend to fit our pollution indicator.

With coated filter housings take care that the coating will not be damaged.

We are not responsible for damages caused by inappropriate handling.

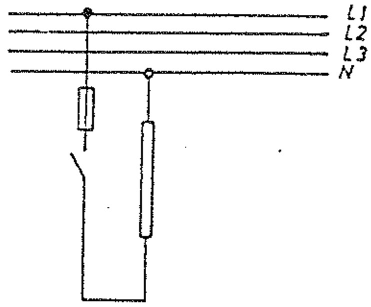
HEATING CARTRIDGE

ELEKTRISCHE HEIZPATRONE
mit Einschraubkopf



Spannung: 220 V Wechselstrom
Schutzart: IP 53
Spez. Oberflächenbelastung: max. 1,2 Watt/cm^2
Werkstoff: Schraubkopf aus St
Heizstab aus St.

Pover Connection : 220v AC
Protecting class : IP 53
Max. surface load: 1,2Watt/cm^2
Material : Steel



DIM: Baugröße	Pover con. Leistung in Watt	D	SW max.	K	L	Item No. Artikel-Nr.
a	100	R¾	36	55	100	5890080
b	160	R1	40		160	5890090
c	400	R1½	60	65	250	5890100
d	540				320	5890110

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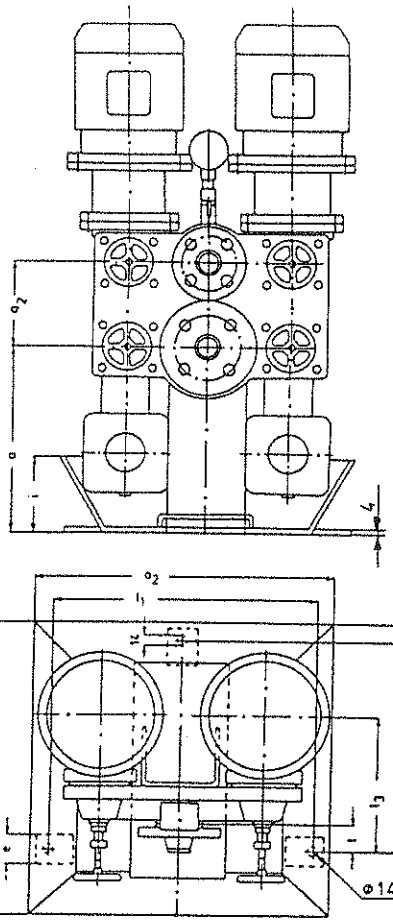
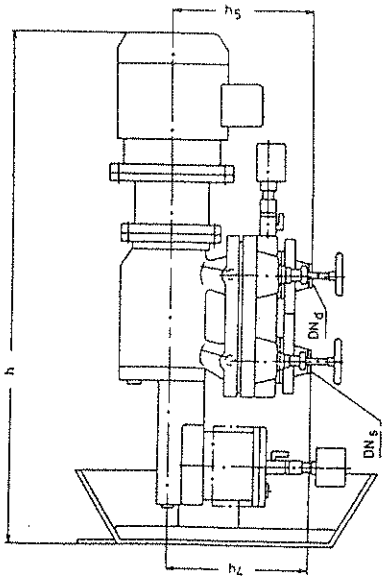
FILTER





Blank flanges PN 16, DIN 2633; screws and packings are included in the scope of supply.

Component identification:

Three-phase a-c motor

-M1 :W2 :U2 :V2 / :U1 :V1 :W1

Technical data:

3-phase a-c motor
- enclosure type : IP 54

Safe ambient temperature : 150°C
Safe gravity feed head : 5 bar
Safe suction head : 0.6 bar

Designs to be supplied:

Standard design: Two pump sets with three-phase a-c motors, a change-over system with suction-side shut-off valves and discharge-side check valves and a discharge-side pressure gauge.

* Additional supplies: Unheated strainer or electrically heated strainer, both with pressure gauges for testing the fouling of the strainer.
Upon request, with survey by the following marine classification societies: GL, LRS, DNV, BV, USSR, USCG and ABS.

MATERIALS.

Design according to TRD
Standard:

Casing parts	GG-25
Casing insert	Grinatal
Screw set	nitrided steel
Filter casing	GG-20
Strainer	perforated steel with V4A fabric cover

Strainer
- Mesh : 0.4 mm
* - Heater
Sizes 250 to 1650 : 220 V/330 W
Sizes 2250 and 3150 : 220 V/410 W

The used one	Size ZALV/ ZASV	Pump dimensions a	a_2	e	h	l	l_1	l_2	l_3	q_2	t	Connestion sizes Suction side DN_s	h_4	Delivery side DN_d	h_5	Tech. l/h data tryk: 4 bar Visc.: 12 cst. 50 Hz	60 Hz	50 Hz Kw	o/min	A	60 Hz Kw	o/min	A
	150	205	380	40	655	20	without filter 340	280	180	110	36	25	183	20	183	168	201	0,25	910	1,05	0,30	1090	1,05
	250															252	302						
	350															400	490	0,37	1400	1,2	0,45	1680	1,2
	550															533	639						
	850															857	1028						
	1150	265			715		with filter									1147	1376	0,55	2800	1,4	0,65	3360	1,4
	1650															1593	1910						
	2250	310	460	40	835	20	420	360	205	130	54	32	192	25	190	2260	2712	1,1	2800	2,7	1,3	3360	2,7
	3150															3157	3788						

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Oil Transfer Pump Unit

Data Sheet
B : 3007.0

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2.6 Technical data for oil transfer pump.

Pump data:

Type	: ZASV 350 G 8 W 20
Oil capacity	: 502 l / h at 4 bar
Oil viscosity	: 6000 sec. R. No. 1 at 100$_0$F

Motor data:

Electrical power source	: 3 x 440 v 60 Hz
RPM	: 1680
Power consumption.	: 0,45 kW
Normal current	: 1,2 A
Start current	: Appr. 7,2A

Fuel Oil Supply Pump

1 General

The supply oil pump unit is a twin type aggregate and is used for handling diese oil, heavy fuel oil or other lubricating fluids. One pump is used as the operatin; pump while the other pump is stand-by.

1.1 Structural Design of the Pumps

Figure 1 shows sectional drawings of the fuel oil pumps, and all item Nos mentioned in this chapter refer to these drawings.
Both pumps of the aggregate are designed as flange mounted pumps and ar connected to the driving motor by means of a pump lantern.
The screw pumps are of the three-screw type. A double-threaded driving spindl (12) and two double-threaded idler spindles (13) are enclosed by bores in th pump casing insert (2). The pump casing (1) accommodates the pump casin insert (2) and is closed by the pump cover, drive side (3) and by the pump cover non-drive side (4) and by the filter casing (9).
The radial and axial bearing of the driving spindle is effected by the compensatin piston guided in the bearing ring.
The shaft seal is a maintenance-free mechanical seal of the unbalanced type.
On the suction and outlet side, the twin aggregates have flange connections.
As an overload protection, a pressure-relief valve is installed in each pump which is serially set to a response pressure of 8 bar.
As a protection against contamination, the pumps are equipped with a filter casing and an incorporated filter with mesh size 0.4 mm.

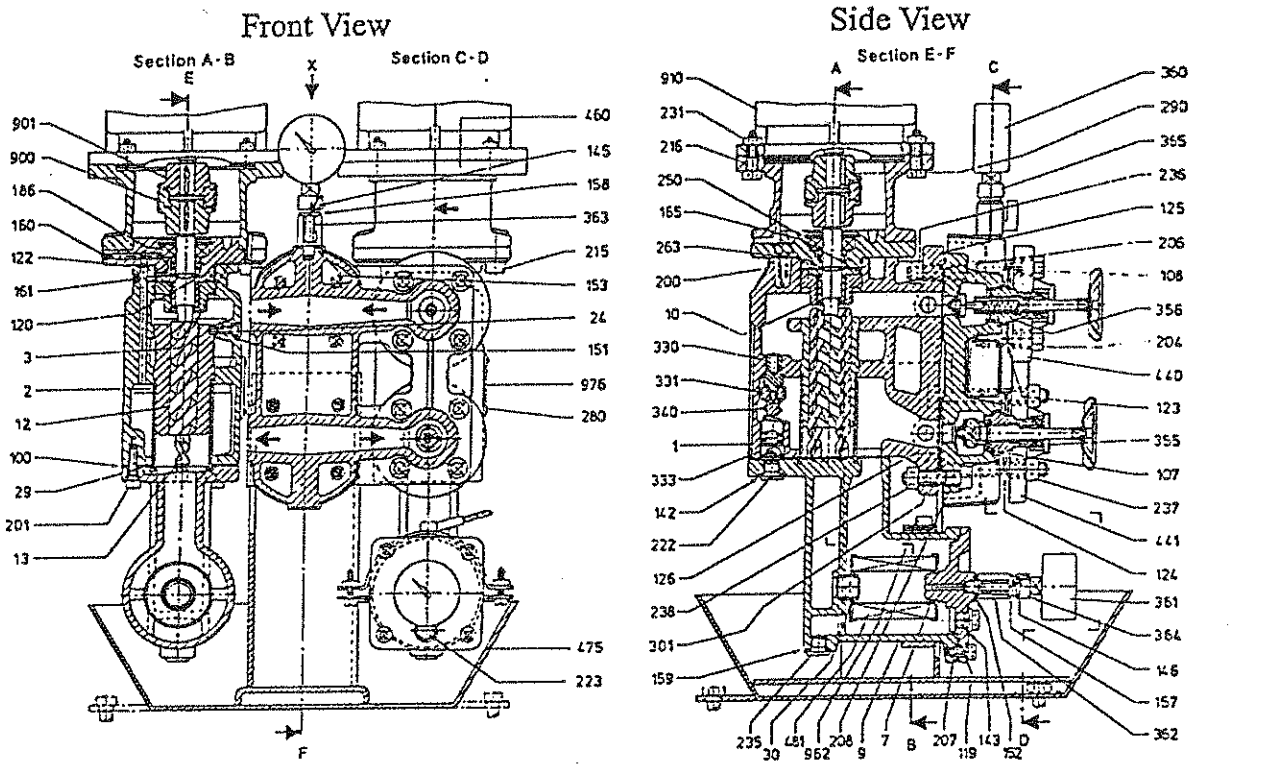
Note: The fluids must not contain any abrasive particles, nor chemically attack the pump materials.

The mano-vacuum meters show the pressure behind the filter. The pressure loss in the respective filter can be detected, and a contamination, if any, recognised.

1.2 Mode of Operation of the Screw Pumps

Through the suction chamber in the reversing valve casing, the fluid to be pumped is conveyed into the suction chamber of the pump in operation. From here, the fluid flows into the spindle chambers which are constantly formed by the rotary motion at the spindle end on the suction side. By the translatory rotary motion, the filled chambers move fluid from the suction side to the outlet side. During this process, the closed chamber volume does not change. At the spindle end on the outlet side, the chamber opens towards the delivery chamber.

Sectional Drawings of the Fuel Oil Pumps



1	Pump casing	153	Joint ring	264	Supporting ring
2	Pump casing insert	156	Joint ring	280	Rivet
3	Pump cover, drive side	157	Gasket	290	Key
7	Casing cover	158	Gasket	301	Reversing valve casing
9	Filter casing	159	Joint ring	330	Valve cone
10	Bearing ring	161	Joint plug	331	Valve spring plate
12	Driving spindle	183	Shaft seal ring	333	Adjusting screw
13	Idler spindle	200	Socket-head cap screw	340	Valve spring
24	Socket-head cap screw	201	Socket-head cap screw	355	Stop valve
29	Pipe	204	Hexagon screw	356	Lockable non-return valve
30	Pipe	205	Hexagon screw	360	Manometer
100	Gasket	206	Socket-head cap screw	361	Mano-vacuummeter
107	Joint ring	207	Hexagon screw	362	Ball valve
108	Joint ring	208	Socket-head cap screw	363	Ball valve
119	O-ring	215	Socket-head cap screw	364	Connector
120	O-ring	216	Hexagon screw	365	Connector
122	O-ring	222	Screw plug	440	Blank flange
123	Gasket	223	Venting screw	441	Blank flange
124	Gasket	227	Screw plug	460	Lantern
125	Gasket	231	Hexagon nut	475	Oil trough
126	Gasket	235	Screw plug	481	Filter
142	Joint ring	236	Hexagon nut	900	Coupling half, pump side
143	Joint ring	237	Hexagon nut	901	Coupling half, drive side
145	Gasket	238	Hexagon nut	910	Driving motor
146	Gasket	250	Circlip	962	Ring heater
151	Sealing washer	260	Supporting washer	976	Name plate
152	Joint ring	261	Supporting washer		

Figure 1 zasv.tif

The fluid conveyed is steadily pushed out into the delivery chamber where it is transported through the delivery chamber in the reversing valve casing into the pressure pipeline. The axial thrust acting on the faces of the profile flanks on the outlet side is hydraulically balanced by an appropriate dimensioning of the compensating piston of the driving spindle. Thus, the bearing is relieved from the hydraulic axial thrust. By appropriate dimensioning of the spindles, the drive of the idler spindles is hydraulic. Only the torque resulting from the liquid friction is

transmitted via the screw thread flanks; therefore, they are practically stress-free and not subject to any wear. The axial thrust of the idler spindles is absorbed by the filter casing. Sealing chamber and suction chamber are interconnected via a return bore. Therefore, irrespective of the delivery pressure, only the suction pressure acts on the shaft seal. All sliding parts are lubricated by the fluid to be pumped and are within the range of full liquid friction.
In spite of spindle rotation, there is no turbulence. The constant chamber volume excludes squeezing.
The structural design and the mode of operation of the screw pump ensure a very low noise level and an almost pulsation-free delivery.

1.3 Structural Design of the Twin Aggregate

The twin is connected with one another by means of a reversing valve casing. Figure 2 shows a switching diagram of the twin aggregate.
The pumps are driven by surface-cooled, three-phase squirrel-cage induction motors. Power transmission is effected by means of a flexible coupling. Additional radial forces must not act on the driving spindle. The pump lanterns serve as protection against accidental contacts.

Attention: Drive by means of belt or gear wheel is not admissible.

For each pump, a non-return valve and a stop valve are provided in the reversing valve casing. The non-return valves operate automatically and are lockable by hand.

1.4 Mode of Operation of the Twin Aggregate

Both screw pumps are jointly attached to the reversing valve casing (301). While one pump is in operation, the spare pump is at stand-by.
The pumps can be actuated by hand. By means of two separate connecting chambers in the reversing valve casing (301), the respective two suction flanges and the pressure flanges of the two pumps are connected with one another. Uninterrupted delivery during the reversing process is thus ensured.
During operation, the two lockable non-return valves (356) and the two stop valves (355) must be opened so that reversal is optionally possible from one pump to the other. The respective pump connected draws the fluid through the suction chamber of the reversing valve casing (301). The operating pressure built up in the delivery chamber of the pump opens the non-return valve (356) of the operating pump. Further, it closes the non-return valve (356) of the non-operating pump through the pressure in the delivery chamber of the reversing valve casing (301). This prevents the spare pump from running in reverse motion.

Switching Diagram

1 - Operating and spare pump
2 - Three-phase motor (910)
3 - Stop valve (355)
4 - Filter (481)
5 - Lockable non-return valve (356)
6 - Mano-vacuummeter with ball valve (361 and 362)
7 - Manometer with ball valve (360 and 363)

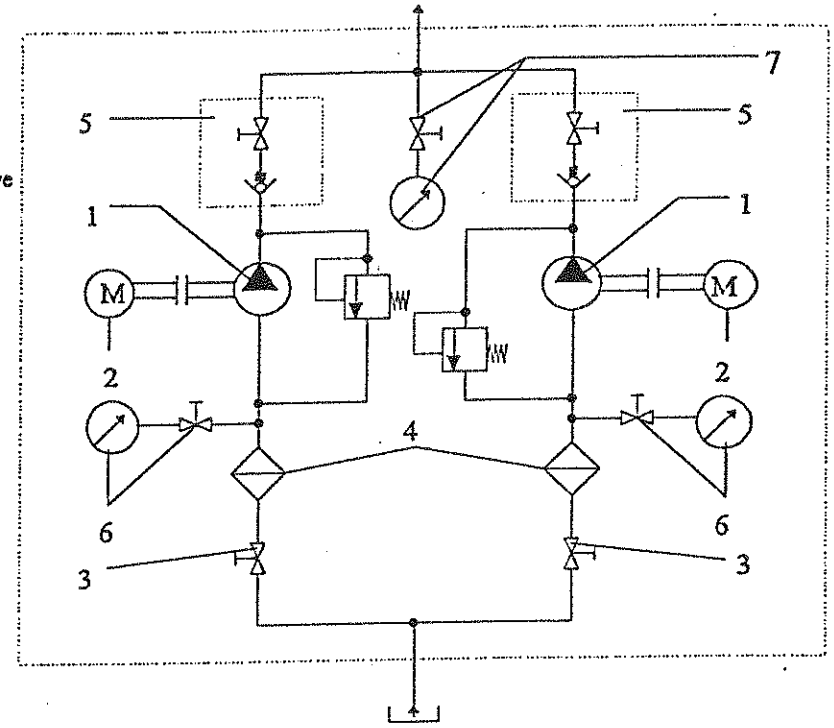


Figure 2 zas.cdr

2 Start-up and Stop

2.1 Preparation for Start-up

Prior to initial operation, the two pumps must be filled with the fluid to be conveyed. At the same time, the sealing required for suction is imparted to the spindles. The pumps must not run dry.
Pumps in vertical installation are topped up through the filling hole at the suction flange of the pump.

Step A: For this purpose the screw plug (227) with the joint ring (156) must be removed.

Step B: The pump must be topped with the fluid to be pumped until it emerges at the vent hole of the pressure flange.

If supply pressure is present, manual topping-up is not required. The pump is topped up through the supply pipeline and vented through the filling and venting hole.

Note: Before the pump unit is set into normal operation, check that the pumps are running with the correct direction of rotation.

2.2 Start-up and Stop

Step A: Prior to starting the operating pump, the two stop valves on the suction side and the two lockable non-return valves on the outlet side of the reversing valve casing and gate valves, if any, must be opened in the plant.

Step B: The pressure-relief valve installed in each pump is serially set to a response pressure of 8 bar. By means of the adjusting screw (333), the opening pressure can be changed within narrow bounds.

Attention: When the pump is started and stopped under pressure load, make sure that the speed and viscosity-dependent pressure load are not exceeded.

If this is not ensured, the pump must be started at zero pressure or disconnected. This also applies to pumps with speed-controlled driving motors. The pressure-relief valve must not be used for regulating the delivery flow.

Step C: During start-up, a vent valve installed on the outlet side of the plant must be opened until the air has escaped from the suction side of the pump. As soon as fluid emerges, the vent valve may be closed. The pump is self-priming and is automatically vented without counter-pressure.

Step D: Switch in the motor of the operating pump.

When the motor has reached its operating speed, inlet pressure and pump outlet pressure must be checked by means of the vacuum meter and the manometer.
The motor must not be overloaded. The power consumption can be checked by means of an ammeter. In this connection, temperature and viscosity of the fluid must be checked.

Step E: Switch off the motor of the operating pump. Attend to even and smooth the slowing-down of the pump.

The non-return valves and stop valves in the reversing valve casing remain open.

Step F: Switch in the motor of the other pump and check it in the same manner as described above.

Note: Pressure gauges such as vacuum gauges and manometers are normally equipped with stop valves. The stop valves may be opened only during start-up for pressure control purposes. During permanent operation, the same must be kept closed.

Attention: The pressure-relief valves installed in the pumps are safety valves which divert the fluid to be conveyed from the outlet side to the suction side in case of an inadmissible pressure rise in the pump.

This circulation operation by way of the pressure-relief valve results in heating
the pumped fluid. The cause must immediately be removed to avoid damages
the pump unit.

2.3 Prolonged Shut-Down

If a prolonged shut-down is projected, the pumps must be drained as describe
below:

Step A: Remove the screw plug (222) from the draining bore.

Step B: The filter drainage is effected after loosening the screw plug (235).

Step C: After the screw plug (222) has been turned out, the adjusting screw (33
of the pressure-relief valve must be turned out for drainage.

Previously, the thread reach of the adjusting screw (333) in the pump casing (1
must be determined and recorded by means of a depth gauge. When the adjustin
screw (333) is screwed in again, this thread reach must be considered in order t
reach the response pressure of the pressure-relief valve again (as a rule, 8 bar).

Step D: The pumps must be protected against corrosion. An outside and insid
preservation must be provided.

It is recommended to use preservatives which have a minimum durability of 1
months. In case of prolonged storage, the preservation of the pump must b
checked at regular intervals.

Step E: The screw pumps should be cranked at least once a week. During thi
process, the parts such as screw spindles and bearings should each tim
change their turning position.

**Attention: Prior to start-up after extended storage, the applied preservativ
must be removed. All elastors (O-rings, mechanical seals) must b
checked for their elasticity of shape.**

---

3 Maintenance

Regular control and maintenance of the pumps and prime movers will extend th
service life.
The below-listed notes apply in general.

- The pumps must not run dry.
- The driving motors must not be overloaded.
- Check suction and pressure pipelines for tightness. The admission of air int
the delivery system must be avoided.
- The mechanical seals must not be heavily leaking.

- Pressure and temperature monitoring instruments must be observed.

3.1.1 Bearing and Lubrication

The driving spindle bearings of each pump are effected by means of the bearin ring designed as the sliding bearing and lubricated by the fluid to be pumped. Under normal operating conditions, the service life of the slide bearin corresponds to the lifetime of the screw pump. However, the service life depend on the degree of contamination of the fluid.

3.1.2 Mechanical Seal

A maintenance-free mechanical seal of the unbalanced type is installed, whos mode of operation corresponds to the requested operating conditions.
A minimum functional leakage in case of non-volatile fluids such as oils must ir principle be expected. In case of heavy leakage due to wear, the mechanical sea must be replaced.

Attention: As dry operation of a mechanical seal must be avoided, the pump may be started in a filled and vented condition only.

3.1.3 Couplings

At regular intervals, the couplings must be checked for wear. A worn coupling must be replaced.

3.1.4 Pressure-Relief Valves

The pressure-relief valves of both pumps must temporarily be checked for workability and function, especially after prolonged idle times. Leaky pressure-relief valves may result in damage to the pump. If necessary, damaged parts must be exchanged and/or replaced.
The pressure-relief valves are set to an opening pressure of normally 8 bar.

Step A: If the opening pressure is to be changed, the screw plug (222) in the pump cover must be removed. Thereafter, the adjusting screw (333) is accessible.

Step B: Clockwise rotation increases, and counter-clockwise rotation decreases the opening pressure. Readjustment should be effected with a perfect manometer and an adjustable pressure stop valve only.

3.1.5 Filter

Each filter casing (9) is equipped with a mano-vacuum meter (361) which shows the pressure behind the filter (481). The pressure loss suggests the degree of filter contamination.

Step A: For an exact determination of the differential pressure, it is recommended to install a manometer in front of each filter at the suction flange of the pumps or in the suction and/or supply pipeline. In case of noticeable differential pressure, the filter (481) must be cleaned or replaced.

Step B: Before the filter of a pump can be cleaned, change over to the stand-by pump must be effected.

Step C: The lockable non-return valve (356) and the stop valve (355) of the stopped pump should be closed.

Step D: After the hexagon screws (207) have been slackened, the (filter) casing cover (7) can be removed, and the filter (481) dismounted from the filter casing (9).

Step E: Draining of the filter casing (9) is possible by means of the screw plug (235).

Step F: Appropriate cleansing agents are Diesel fuel or a solvent-free cold cleaner. Other special cleansing agents may be used with the concentration depending on the kind and thickness of the dirt deposits to be removed. A soft brush may serve as a cleansing tool. Do not use sharp objects.

Step G: In case of excessive contamination, it is recommended to replace the filter (481) at certain intervals.

Step H: After draining, blow the filter off with compressed air from the clean side to the dirty side (from the inside to the outside, not the other way around!).

Step I: Clean the dirt particles deposited at the filter casing bottom

Step J: After cleaning, the filter (481) is loosely mounted on the pipe (30) in the filter casing bottom.

Step K: The (filter) casing cover (7) is fixed to the filter casing (9) again.

Note: The O-ring (119) must lie in its groove and must not be damaged. Replace, if necessary. The (filter) casing cover (7) must be closed airtight so that the pump may not draw in any air.

Step L: Open the non-return valve (356) and the stop valve (355) again.

Step M: In case of supply pressure, the filter casing (9) must be vented by means of the screw plug (223) for restarting the pump.

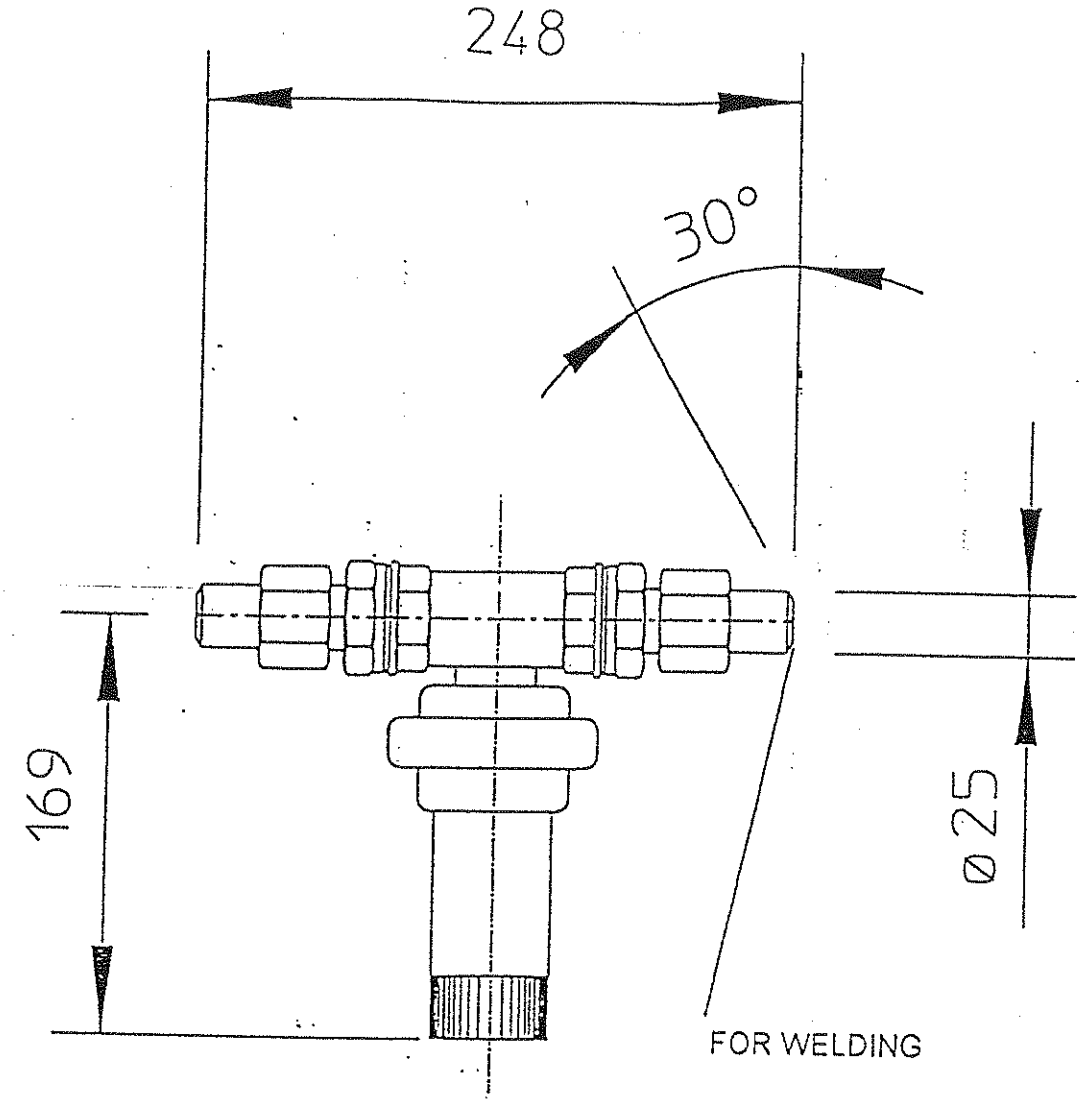
4 Troubles, Causes and Remedial Action

By means of Table 1, the cause of problems, if any, can be determined. In case of problems not listed herein or if they cannot be traced back to any of the causes listed, we recommend to check with the supplier.

Trouble and Cause Scheme

Problems	Causes	Action Nos.
Pump does not deliver	Wrong sense of pump rotation Pump without fluid to be handled Stop valves closed	Change any two phases at the motor. Fill pump with fluid to be handled. During operation,, the stop valves and non return valves in the pipeline and at the reversing valve casing must be completely open.
Pump is not vented	No venting facility	Mount vent valve in pressure pipeline.
Pump operates at min. output	Suction pipeline leaky Filter clogged	Retighten flange joints, replace gaskets, if necessary. Clean and/or replace filter insert.
Pump operates noisily	Suction pipeline leaky Geodetic suction head too high Air inclusion in the fluid pumped Filter clogged Suction pipeline resistance too great	Retighten flange joints, replace gaskets, if necessary. Raise liquid level in tank / lower pump. Attend to better air separation in tank. Clean and/or replace filter insert. Reduce suction pipeline resistance, e.g. by a greater pipeline cross-section and/or a design providing a more favourable flow.
Motor gets warm	Motor power consumption	Check speed and power consumption of the motor. Compare voltage and frequency with the motor type plate.

Table 1



Materials (WN = Material Number)

Body	Brass CuZn 37 Pb (WN 2.0332)
Seat	Stainless steel WN 1.4104
Plug	Brass CuZn 40 with EPDM soft seating[1]
Balancing bellows	Stainless steel WN 1.4301
Valve spring	Stainless steel WN 1.4310
Operating diaphragm	EPDM (Ethylene/propylene)[1]
Set point adjuster	Glass-fibre reinforced polyamide

Technical Data · All pressures in bar (gauge)

Controller Type	44-1	44-6	44-0	44-5
Control valve				
Max. permissible temperature	110 °C		200 °C	
Nominal pressure	PN 16		PN 25	
Max. permissible differential pressure	Standard version with stainless steel bellows: 16 bar			
Connection (Nominal size)[1]	G ½ (DN 15)	G ¾ (DN 20)	G 1 (DN 25)	
K_{VS} value	3.2	4	5	
Special version	0.4/1/2.5	–	–	
z value	0.60	0.60	0.55	
Actuator				
Set point ranges	continuously adjustable 0.2...2; 1...4; 2...6 or 4...10 bar			
Max. permissible ambient temperature:	60 °C			

AALBORG INDUSTRIES

SAMSON

PRESSURE REGULATING VALVE

Data Sheet
B: 3102.0
Page 1 of 1

Überströmventil
Typ 44-6

Pressure Controller
Type 44-6 Excess Pressure Valve

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Bild 1 · Überströmventil Typ 44-6

Fig. 1 · Excess pressure valve Type 44-6

1. Aufbau und Wirkungsweise

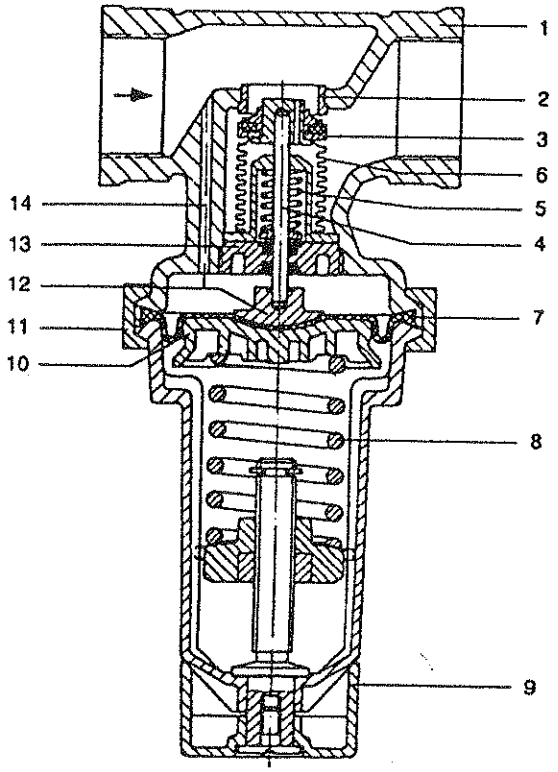
Das Überströmventil Typ 44-6 dient der Regelung von Drücken vor dem Ventil und besteht im wesentlichen aus dem Ventilkörper mit Kegel, Kegelstange und Entlastungsbalg und einem Oberteil mit federgefesselter Stellmembran, Feder und Sollwertsteller.

1. Construction and method of operation

The excess pressure valve Type 44-6 is used for controlling pressures upstream of the valve and consists essentially of a valvebody with plug, plug stem and balancing bellows and an operating section with spring loaded operating-diaphragm, spring and set-value adjuster.

Ausgabe Oktober 1988
Edition October 1988

Einbau- und Bedienungsanleitung
Mounting and operating instruction
EB 2-2521 D/E



1 Ventilgehäuse	1 Valve body
2 Sitz (eingewalzt)	2 Seat (rolled in)
3 Kegel	3 Plug
4 Kegelstange	4 Plug stem
5 Feder	5 Spring
6 Entlastungs-Metallbalg	6 Balancing metal bellows
7 Stellmembran	7 Operating diaphragm
8 Sollwertfeder	8 Set-value spring
9 Sollwertsteller	9 Set-value adjuster
10 Membranteller	10 Diaphragm plate
11 Schelle	11 Clamp
12 Druckstück	12 Thrust piece
13 Stopfen	13 Stopper
14 Gehäusebohrung	14 Boring

Bild 2 · Schnittzeichnung

Fig. 2 · Drawing

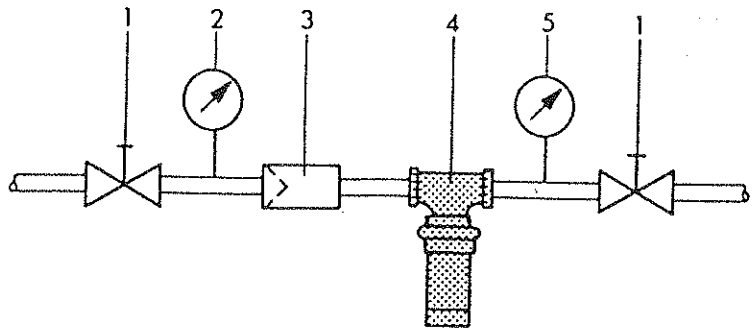
Der zu regelnde Vordruck (Überströmdruck) wirkt über die Gehäusebohrung (16) auf die Stellmembran (7) und wird in eine Stellkraft umgeformt.

Bei steigendem Druck vor dem Ventil bewegt sich der Kegel, der Kraft der Sollwertfeder (8) entgegen, so daß ein größerer Querschnitt freigegeben wird und der Druck wieder absinken kann. Bei fallendem Druck vor dem Ventil läuft der Vorgang umgekehrt.

Durch Drehen des Sollwertstellers (9) wird die Federkraft und damit der Sollwert geändert.

The upstream pressure (excess pressure) that is to be kept constant is transmitted via a hole in the valve body (14) to the operating diaphragm (7) and converted into a positioning force. At rising pressure upstreams the valve the plug moves against the force of the set-value spring, so that a greater sectional area will be released and the pressure can sink. At falling pressure upstreams the valve the process is going invers.

At rotating the set-value adjuster (9) the spring force and with that the set-value will be changed.



1	Absperrventil	1	Shut-off valve
2	Manometer für Überströmdruck	2	Pressure gauge for excess pressure
3	Schmutzfänger	3	Strainer
4	Überströmventil	4	Excess press. valve
5	Manometer für Gegendruck	5	Pressure gauge for downstream pressure

Bild 3 · Einbaubeispiel

Fig. 3 · Example of mounting

2. Einbau

2.1 Einbaulage

Das Überströmventil kann beliebig eingebaut werden. Bei Flüssigkeiten und Temperaturen über 60 °C und bei waagerecht verlaufenden Rohrleitungen sollte der Einbau unbedingt mit nach unten hängendem Sollwertsteller erfolgen. Die Durchflußrichtung muß mit dem Gehäusepfeil übereinstimmen.

2.2 Schmutzfänger

Da vom Medium mitgeführte Dichtungsteile, Schweißperlen und andere Verunreinigungen die einwandfreie Funktion und vor allem den dichten Abschluß des Ventils beeinträchtigen können, sollte vor dem Überströmventil ein Schmutzfänger (SAMSON Typ 1) eingebaut werden. Der Siebkorb des Schmutzfängers muß bei waagerechtem Einbau nach unten hängen und bei senkrechtem Einbau nach oben zeigen. Es ist darauf zu achten, daß genügend Platz zum Ausbau des Siebes vorhanden ist.

2.3 Absperrventil, Manometer

Es empfiehlt sich, vor dem Schmutzfänger und hinter dem Regler je ein Handabsperrventil einzubauen, um die Anlage zu Reinigungs- und Wartungsarbeiten und bei längeren Betriebspausen abstellen zu können.

Zur Beobachtung der in der Anlage herrschenden Drücke sollte vor und hinter dem Überströmventil je ein Manometer eingebaut werden.

2. Installation

2.1 Mounting position

The excess pressure valve can be mounted in any desired position, but in the case of liquids, temperatures above 60 °C and in horizontal pipelines it must be installed with the set-value adjuster hanging downwards.

The direction of flow must correspond with the arrow on the body.

2.2 Strainer

Pieces of packing or gasket, welding beads or other foreign matter carried along by the fluid can impair the operation and especially tight sealing of the valve. Therefore, installation of a strainer (SAMSON Type 1) upstream of the controller is recommended. The direction of flow must coincide with the arrow of the body. The strainer filter must hang downwards. Care should be taken to allow sufficient space to remove the filter.

2.3 Shut-off valves, pressure gauges

It is recommended that a manual shut-off valve be installed ahead of the strainer and behind the controller in order to permit deactivation of the equipment for cleaning and maintenance and during long periods where operation is not required.

Pressure gauges should be fitted in front and behind the controller to permit observation of the pressure within the system.

3. Bedienung

3.1 Sollwerteinstellung

Sollwert unter Beobachtung des Manometers für Überströmdruck am Sollwertsteller (9) einstellen. Rechtsdrehen ergibt höheren, Linksdrehen niedrigeren Sollwert.

3.2 Störungen

Weicht der Überströmdruck (Manometeranzeige auf der Vordruckseite stark vom eingestellten Sollwert ab, so sind entweder Sitz und Kegel verschmutzt oder durch natürlichen Verschleiß undicht geworden.

Treten Undichtigkeiten nach außen auf, sollte die Membran überprüft und wenn erforderlich ausgetauscht werden.

Abhilfe

3.2.1 Reinigen bzw. Austausch des Kegels

Anlage abstellen und Sollwertsteller (9) auf niedrigsten Wert einstellen (Feder (8) entspannen).

Schelle (11) abschrauben. Vorsicht, Feder (8) ist noch leicht vorgespannt. Gesamtes Kunststoffoberteil mit Feder (8), Membranteller (10) und Membran (7) abnehmen, Druckstück (12) abziehen.

Stopfen (13) herausschrauben und komplettes Metallbalgteil mit Kegel (3) und Kegelstange (4) herausziehen.

Sitz und Kegelteil gründlich reinigen.

Ist der Kegel oder der Metallbalg beschädigt, so muß das komplette Teil erneuert werden.

Zur Montage in umgekehrter Reihenfolge vorgehen.

3.2.2 Austausch der Membran

Anlage abstellen und Sollwertsteller (9) auf niedrigsten Wert einstellen (Feder (8) entspannen).

Schelle (11) abschrauben. Vorsicht, Feder (8) ist noch leicht vorgespannt. Kunststoffoberteil mit Feder und Membranteller (10) abnehmen. Membran herausnehmen und gegen eine neue ersetzen. Zur Montage in umgekehrter Reihenfolge vorgehen.

3. Operation

3.1 Set-value adjustment

Set-value adjust at the set-value adjuster (9) under watching the pressure gauge for excess pressure.

Rotating right results a higher, rotating left a lower set-value.

3.2 Faults

If the excess pressure (pressure gauge indication on the frontside) is very deviating from the adjusted set-value, so the seat and the plug either are dirty or are untightly by normal wear.

At arising untightness to outside, the diaphragm should be checked and if necessary, it should be replaced.

Rectification

3.2.1 Cleaning resp. replacing of the plug

Turn off the system and adjust the set-value adjuster (9) down to the lowest value (spring is releasing).

Screw off the clamp (11). Take care, the spring is still prestressed ligth.

Take off the complete plastic operation section with spring (8), diaphragm plate (10) and diaphragm (7), pull down the thrust piece (12).

Screw out the stopper (13) and pull out the complete balancing metal bellows with plug (3) and plug stem (4).

Clean seat and plug carefully.

If the plug or the balancing metal bellows are demaged, so the complete part must be renewed.

For mounting proceed in revers order.

3.2.2 Replacing of diaphragm

Turn off the system and adjust the set-value adjuster (9) down to the lowest value (spring is releasing).

Screw off the clamp (11). Take care, the spring (8) is still prestressed ligth.

Take off the plastic operation section with spring and diaphragm plate (10).

Put out the diaphragm and replace it toward a new.

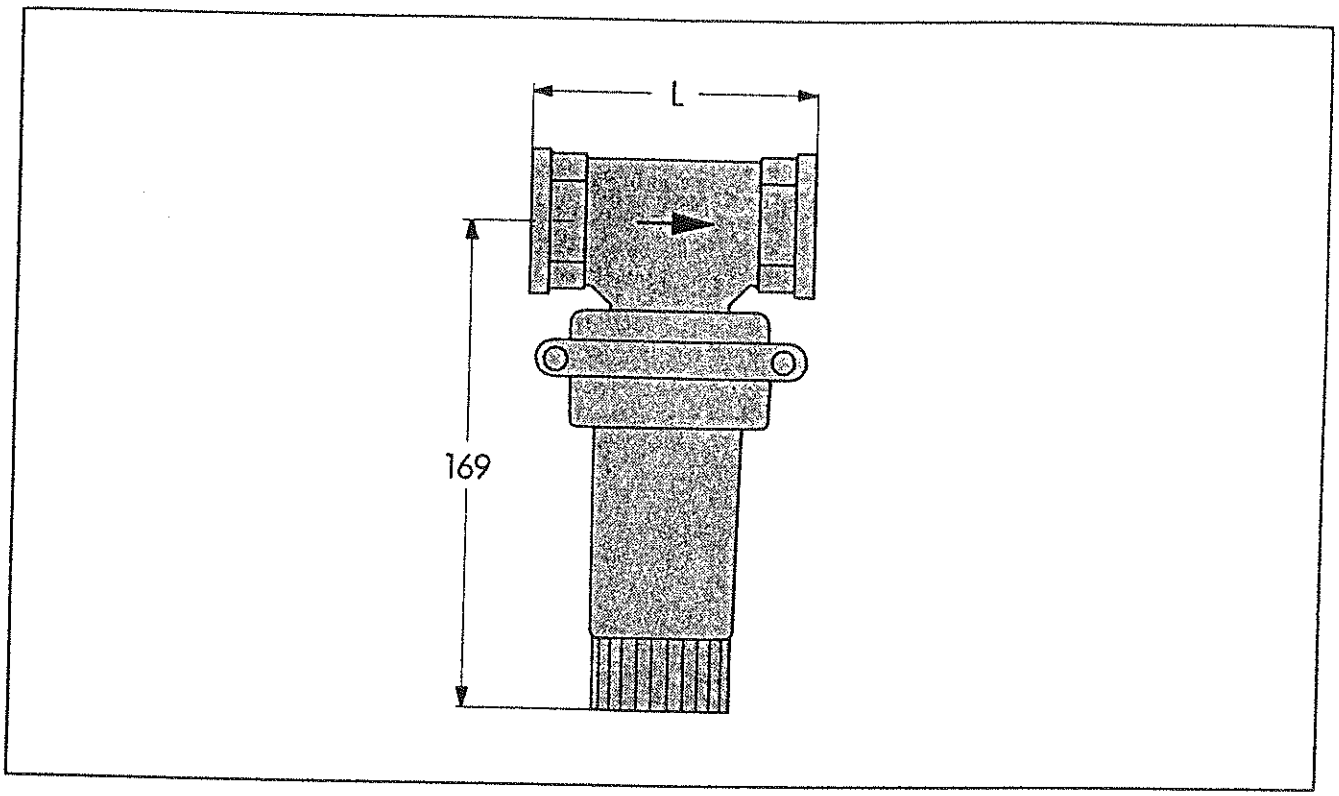
For mounting proceed in revers order.

4. Maße in mm und Gewichte

Anschlußgröße	R 1/2"	R 3/4"	R 1"
Baulänge L	65	75	90
Gewichte ca. kg	0,8	0,9	1

4. Dimensions in mm and weights

Size of connection	R 1/2"	R 3/4"	R 1"
Length L	65	75	90
Weights kg approx.	0,8	0,9	1



5. Rückfragen an den Hersteller

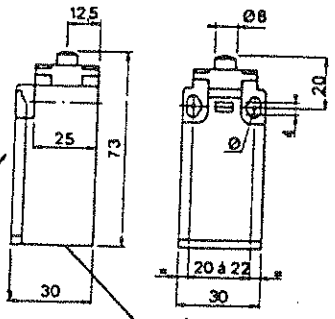
1. Typ und Nennweite des Überströmers
2. Auftrags- und Erzeugnisnummer (auf dem Typenschild eingeschlagen)
3. Vordruck und Gegendruck
4. Durchfluß in m^3/h
5. Ist ein Schmutzfänger eingebaut?
6. Einbauskizze

5. In case of inquiries, please supply the following informations.

1. Type and nominal diameter of the excess pressure valve.
2. Order- and product-number (engraved on the identification plate).
3. Upstream and downstream pressure.
4. Flow rate in m^3/h.
5. Whether a strainer is installed.
6. Installation drawing.

MICRO SWITCH

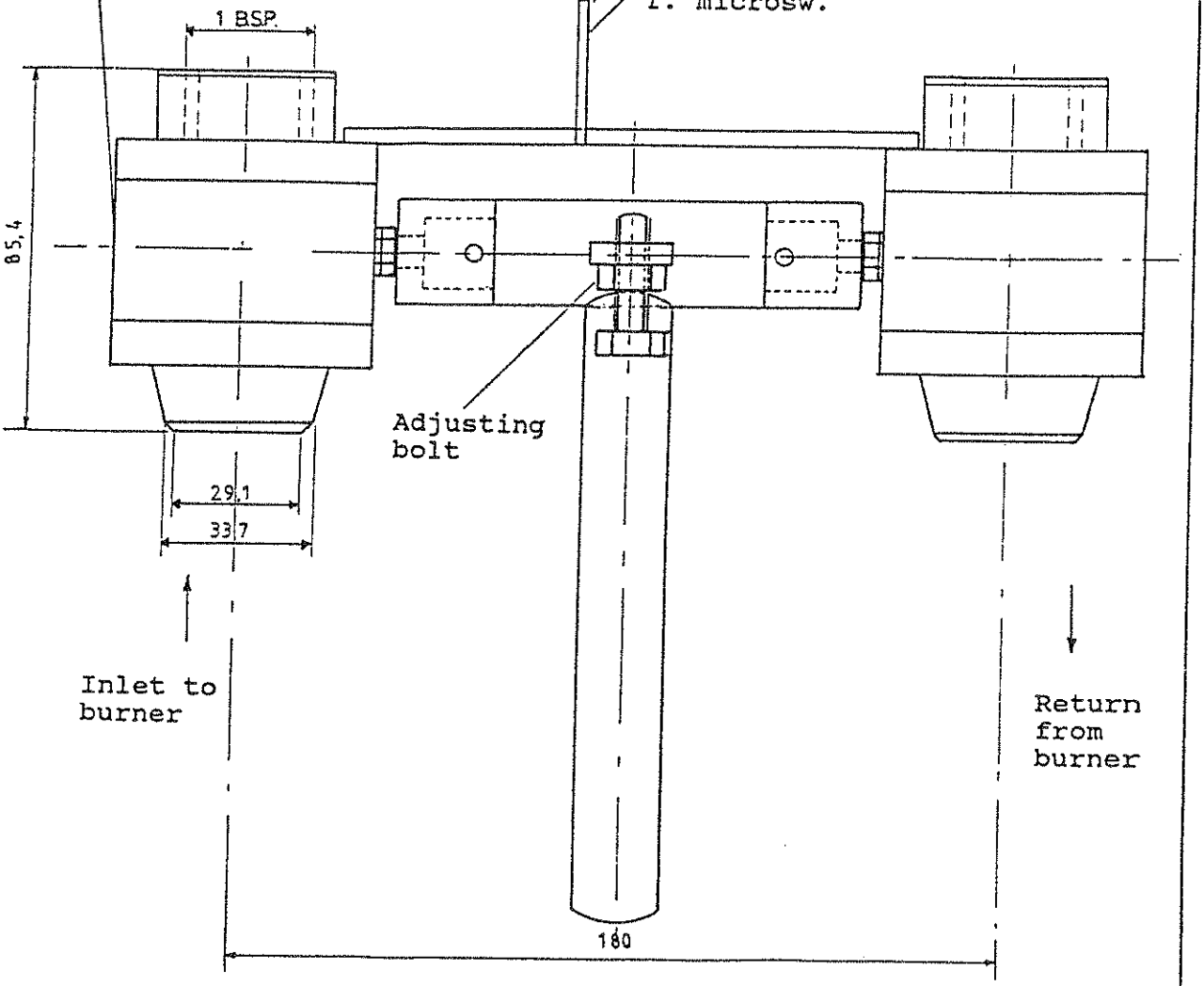
XCK-P110,



BALL VALVE TYPE MF R55T CBS

mounted with cable gland PG 11

Plate f. microsw.



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Quick Closing Valve
Type R55T2 DN 25

Data Sheet
B : 3062.0
Page 1 of 1

Anleitung für Anlageplanung, Einbau und Inbetriebsetzung

Instructions pour planification, montage et mise en service

Instructions for Planning, Installing and Commissioning

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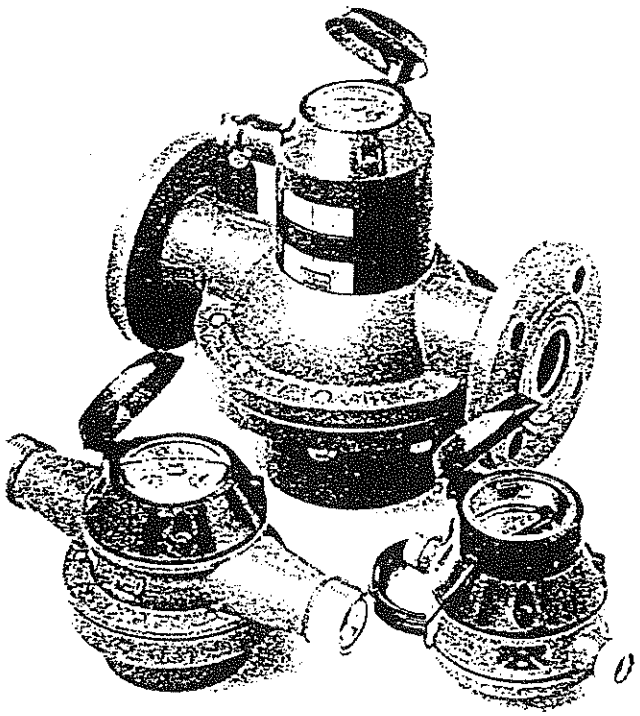
CONTOIL VZO 15 ... 50

Ölzähler
Compteurs de fuel
Oilmeters



3.3 Nachfolge-Geräte

Nachfolge-Geräte benötigen teilweise eine Programmierung für Impulswerte oder Frequenz (siehe deren Bedienungsanleitung).
Impulswerte der Messgeräte: siehe Typenschilder
Die Frequenz berechnet sich aus der Formel:

3.3 Auxiliaires de mesure

Certains auxiliaires de mesure doivent être adaptés à la valeur d'impulsions ou à la fréquence (voir leurs instructions de service).
Pour les valeurs d'impulsions, voir les plaques signalétiques des compteurs.
La fréquence se calcule selon la formule suivante:

3.3. Ancillary units

Ancillary units partially require a programmation for pulse values or frequency (see their service instructions).
Pulse values of the measuring units: see type plates
The frequency is established with the following formula:

$$\frac{1}{\ell/\text{imp.}} = \begin{array}{l}\text{Anzahl Imp. pro}\\ \textit{Impulsions par}\\ \text{Pulses by}\end{array} \quad \ell \times \frac{\begin{array}{l}\text{Maximaler Durchfluss}\\ \textit{Débit maximal}\\ \text{Maximal flow rate}\end{array} \quad Q\,\text{max}}{3600} = \begin{array}{l}\text{Frequenz in Hz}\\ \textit{Fréquence en Hz}\\ \text{Frequency in Hz}\end{array}$$

3.4 Funktionskontrolle

- Anlage gemäss Anleitung 4.1...4.4 in Betrieb setzen
- Funktion der Zubehörgeräte überprüfen

3.4 Contrôle de fonctionnement

- *Mettre l'installation en service selon instructions 4.1...4.4*
- *Contrôler le fonctionnement des unités auxiliaires*

3.4 Function control

- Put installation into operation following points 4.1...4.4
- Check functioning of ancillaries

4. INBETRIEBSETZUNG

4.1 Anlage in Betrieb setzen, Absperrorgane langsam öffnen, Leitungssystem langsam füllen.

4.1.1 Anlage gut entlüften

Druckschläge sind zu vermeiden damit das Messgerät nicht beschädigt wird! Lufteinschlüsse verursachen bei allen Messsystemen Fehlmessungen und können im Betrieb das Messgerät beschädigen.

4.2 Dichtheitskontrolle der Geräteanschlüsse durchführen.

4.3 Durchfluss der Anlage kontrollieren.

4.3.1 Messung der Durchflussmenge anhand des Rollenzählwerkes während 30...60 Sek.

Berechnung der Durchflussmenge pro Stunde nach der Formel:

$$\frac{\begin{array}{l}\text{totalisierte Menge in } \ell \times 3600\\ \text{Messzeit in Sekunden}\end{array}}{} = \ell \text{ pro Stunde}$$

Sollte der errechnete Wert über der Messgerätespezifikation (Q max.) liegen, ist hinter dem Messgerät eine Durchflussdrosselung einzubauen oder ein grösseres Messgerät zu verwenden.

4.4 Elektrisches und Zubehör

4.4.1 Funktionen prüfen.

4. MISE EN SERVICE

4.1 Mettre l'installation en service, ouvrir lentement les vannes et remplir le circuit lentement.

4.1.1 Bien purger l'installation

Eviter les coups de béliers pour ne pas endommager le compteur. Des inclusions d'air causent des erreurs de mesure quelque soit le type de compteur et peuvent l'endommager.

4.2 Contrôler l'étanchéité du raccordement.

4.3 Contrôler le débit de l'installation

4.3.1 Mesure du débit à l'aide du totalisateur à rouleaux pendant 30...60 sec.

4.3.2 Etablir le calcul de volume de débit par heure selon la formule:

$$\frac{\begin{array}{l}\textit{Quantité totalisée en } \ell \times 3600\\ \textit{Temps de mesure en secondes}\end{array}}{} = \ell \textit{ par heure}$$

Si la valeur dépasse la spécification du compteur (Q max), soit une soupape d'étranglement est à installer derrière le compteur, soit une unité de mesure plus grande est à installer.

4.4 Equipement électrique et accessoires.

4.4.1 Contrôler le fonctionnement

4. OPERATING START

4.1 Put installation into operation, open valves slowly, fill pipeline network gradually.

4.1.1 Vent the installation well.

Pressure shocks must be avoided in order not to damage the measuring unit. Inclusions of air cause measuring errors in all measuring units and in operation they may damage it.

4.2 Proceed to a check of the tightness of the connections of the unit.

4.3 Check the flow of the installation

4.3.1 Metering of the flow rate with the roller counter for 30...60 sec.

4.3.2 Establish the flowrate per hour with the formula:

$$\frac{\begin{array}{l}\text{Totalised volume in } \ell \times 3600\\ \text{Measuring time in seconds}\end{array}}{} = \ell \text{ by hour}$$

Should the established value lie over and above the specification of the measuring unit (Q max), either a flow control choke (throttle) must be inserted behind the measuring unit or a bigger measuring unit must be used.

4.4 Electrical equipment and ancillaries

4.4.1 Check proper functioning.

5. WARTUNG

5.1 Schmutzfänger

5.1.1 Schmutzfänger periodisch reinigen, anfänglich in relativ kurzen Abständen.

Berücksichtigen Sie beim Öffnen des Schmutzfängers die Punkte 2.3.2 - 2.3.3 und bei der Wiederinbetriebsetzung die Punkte 4.1 - 4.4 der Betriebsanleitung.

5.2 Zähler / Ersatzteile

5.2.1 Anschlüsse periodisch auf Dichtheit kontrollieren, wenn erforderlich nachziehen. Zur Reinigung und Kontrolle können Messkammer und Ringkolben der Zähler DN15...50 demontiert werden, ohne diese aus der Leitung auszubauen.

5. ENTRETIEN

5.1 Collecteur d'impuretés

5.1.1 Nettoyer le collecteur d'impuretés, au début à intervalles courts.

Observer lors de l'ouverture du collecteur d'impuretés les points 2.3.2 - 2.3.3 et lors de la remise en marche les points 4.1 - 4.4 de ce document.

5.2 Compteur / Pièces de rechange

5.2.1 Contrôler périodiquement l'étanchéité du raccordement et, si nécessaire, reserrer. Pour le contrôle/nettoyage, la chambre de mesure et le piston rotatif des compteurs DN15...50 peuvent être enlevés du compteur sans le démonter de la conduite.

5. MAINTENANCE

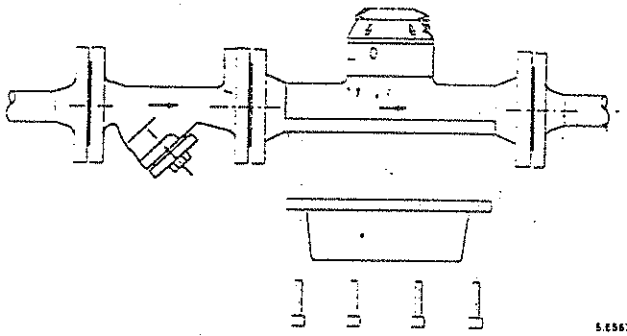
5.1 Dirt trap

5.1.1 Dirt traps must be cleaned periodically, initially at short intervals.

When opening the dirt trap please pay attention to points 2.3.2 - 2.3.3. When putting back into operation watch points 4.1-4.4 of these instructions.

5.2 Meter / spare parts

5.2.1 Check connections periodically for tightness and if necessary tighten again. For control and cleaning the measuring chamber and the ring piston of the meters DN15...50 can be removed without demounting of the meter itself.



5.E5677.2

5.2.2 Der Reinigungs- und Revisions-Zyklus ist stark von den Betriebsbedingungen abhängig. Bei günstigen Bedingungen genügen 5-10 Jahre. Geräte auf Korrosion überprüfen.
Bei Zusatzgeräten bitte Angaben in deren Einbau-/Betriebsanleitung beachten.

5.2.2 Le cycle de nettoyage et de révision dépend fortement des conditions de service. Dans des conditions avantageuses 5 à 10 ans suffisent. Contrôler les unités quant à la corrosion.
Dans le cas d'équipements supplémentaires ou additionnels observer leurs instructions de montage et de service.

5.2.2 The cleaning and revision cycle depends largely on the conditions of operation. Under favourable conditions 5-10 years are sufficient. Check the units for corrosion.
In Case of ancillary equipment observe their mounting and operation instructions.

5.2.3 Ersatzteillisten können bei AQUAMETRO angefordert werden.

5.2.3 Des listes de pièces de rechange sont à disposition auprès d'AQUAMETRO.

5.2.3 Spare part-lists may be requested from AQUAMETRO.

6. GARANTIE / HAFTUNG

AQUAMETRO garantiert im Rahmen der Allgemeinen Verkaufs- u. Lieferbedingungen für die Qualität der Produkte.

AQUAMETRO-Geräte werden nach ISO-Normen und -Richtlinien hergestellt.

Einbau- und Bedienungsanleitung beachten !

Gerät nur für den bestimmten Verwendungszweck einsetzen.

Gerät instandhalten, nach Vorschrift warten.

Zubehör nur verwenden, wenn eine sicherheitstechnisch unbedenkliche Verwendungsfähigkeit vorliegt.

Die Haftung für Installation und fachgemässe Handhabung des Messgerätes geht auf den Eigentümer oder Betreiber über.

6. GARANTIE / RESPONSABILITE

AQUAMETRO garantit dans le cadre des conditions générales de vente et de livraison pour la qualité des produits.

AQUAMETRO produit ses appareils selon les normes et les directives ISO.

Observer les instructions de montage et d'utilisation !

N'utiliser le compteur que pour la fonction à laquelle il est destiné.

Maintenir le compteur en bon état, entretien selon prescription.

N'utiliser des auxiliaires qu'à condition que cela ne présente aucun obstacle de sécurité technique.

La responsabilité pour installation et exploitation professionelle du compteur est transférée au propriétaire ou utilisateur.

6. Guarantee / Liability

AQUAMETRO guarantees within the bounds of the general sales and supply conditions for its products.

AQUAMETRO units are built according to ISO norms and directives.

Please observe the mounting and operations instructions !

Use the unit exclusively for its designed purpose.

Maintain the unit and service it according to prescriptions.

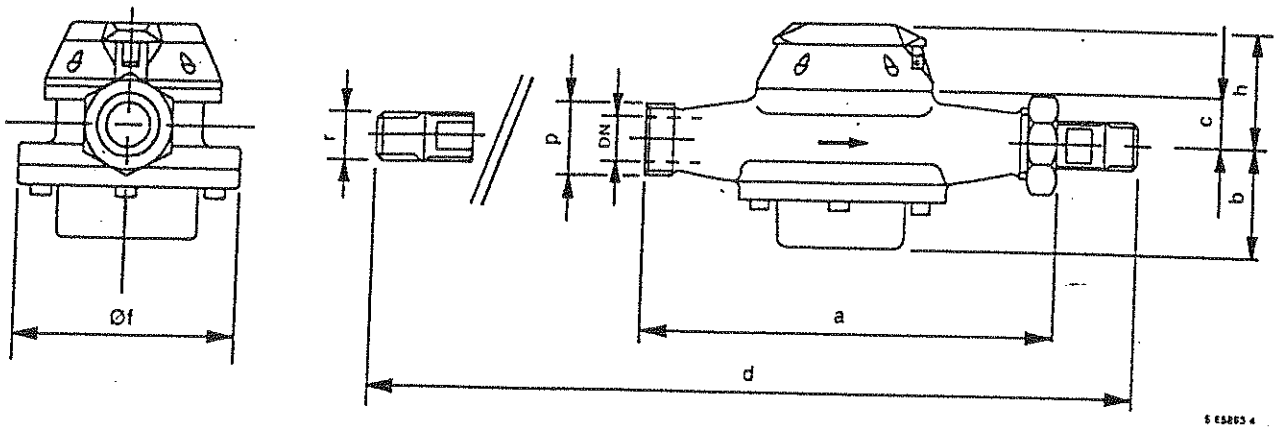
Use accessories only if their applicability is technically safe.

The liability installation and professional operation of the measuring unit is transferred to the owner or operator.

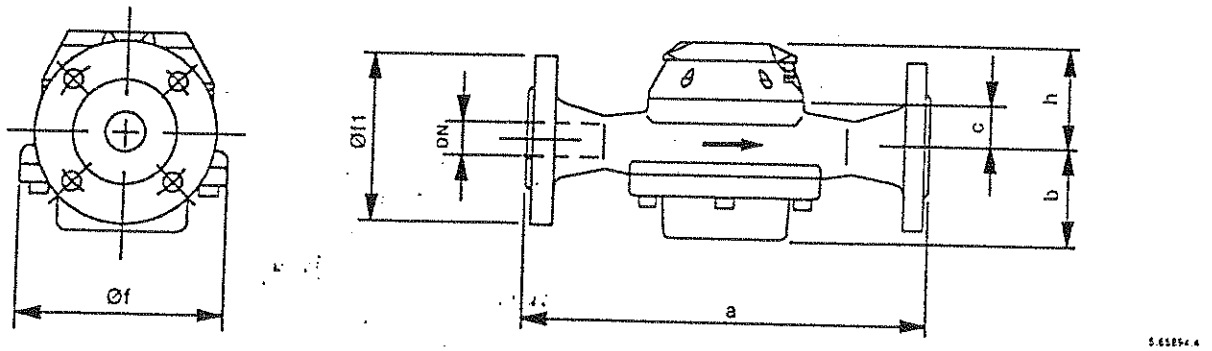
7. MASSBILDER

7.1 VZO 15...25

7.1.1 VZO mit Gewindestutzen (RC)



7.1.2 VZO mit Flansch (FL)



7. *SCHEMAS D'ENCOMBREMENT*

7.1 VZO 15...25

7.1.1 VZO avec embouts filetés (RC)

7.1.2 VZO avec brides (FL)

7. DIMENSIONAL SKETCHES

7.1 VZO 15...25

7.1.1 VZO with threaded ends (RC)

7.1.2 VZO with flanges (FL)

	DN		a	b	c	d	ø f	ø f1	p	r	Mit Aufbaugeräten (7.3) *Avec dispositifs compl.* With ancillaries h	h	h
VZO 15 RC / FL	15 mm	1/2"	165	45	20	260	105	95	G 3/4"	G 1/2"	59	83	137
VZO 20 RC / FL	20 mm	3/4"	165	54	20	260	105	105	G 1"	G 3/4"	59	83	137
VZO 25 RC*) / FL	25 mm	1"	260	77	24	375	130	115	G 1 1/4"	G 1"	63	87	141

ab anfangs 1993 nur noch in Baulänge a = 190 mm, d = 305 mm erhältlich

*) *à partir du début 1993 disponible uniquement en a = 190 mm, d = 305 mm*

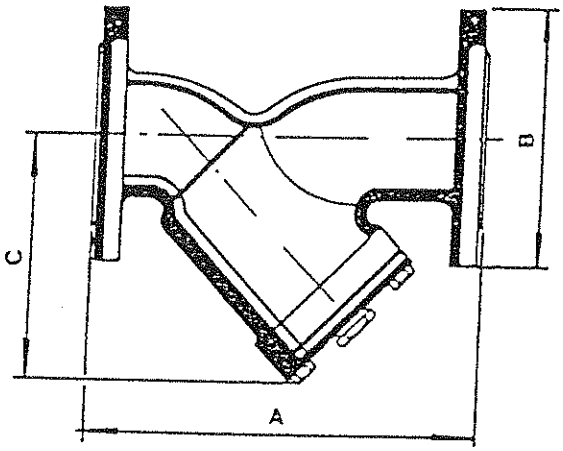
*) from beginning of 1993 available only in installation length a = 190 mm, d = 305 mm

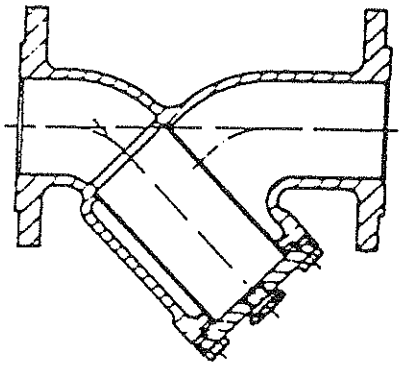
Flanged «Y» type strainer

TEST PRESSURE

Hydrostatic shell test:
61 Kg/cm² (PN-40)

Cast carbon steel PN-40



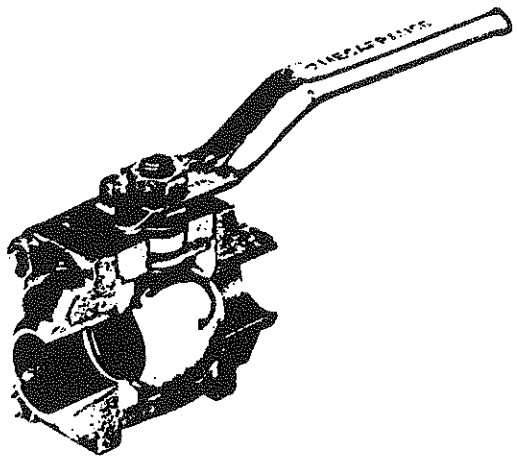


The used one

SIZE DN	A	B PN-40	C	Weight/Peso Kg. PN-40
15	130	95	75	2
20	150	105	85	2.6
25	160	115	95	3.8
32	180	140	120	8
40	200	150	140	9.5
50	230	165	160	13
65	290	185	180	20

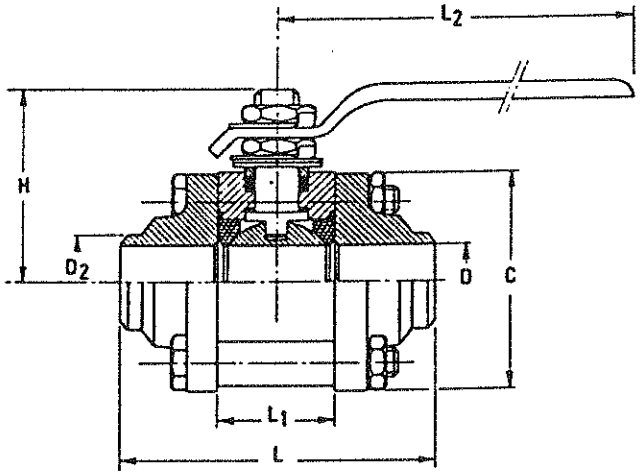
DN 15-20-25 with screwed cap.
Larger sizes bolted bonnet.

Ball valve serie "R" full bore from 8 to 40 mm



Construction

Body : stainless steel or carbon steel
Ball and stem : stainless steel 316 L or AISI 420
Seats and seals : PTFE
End connections : stainless steel or carbon steel.

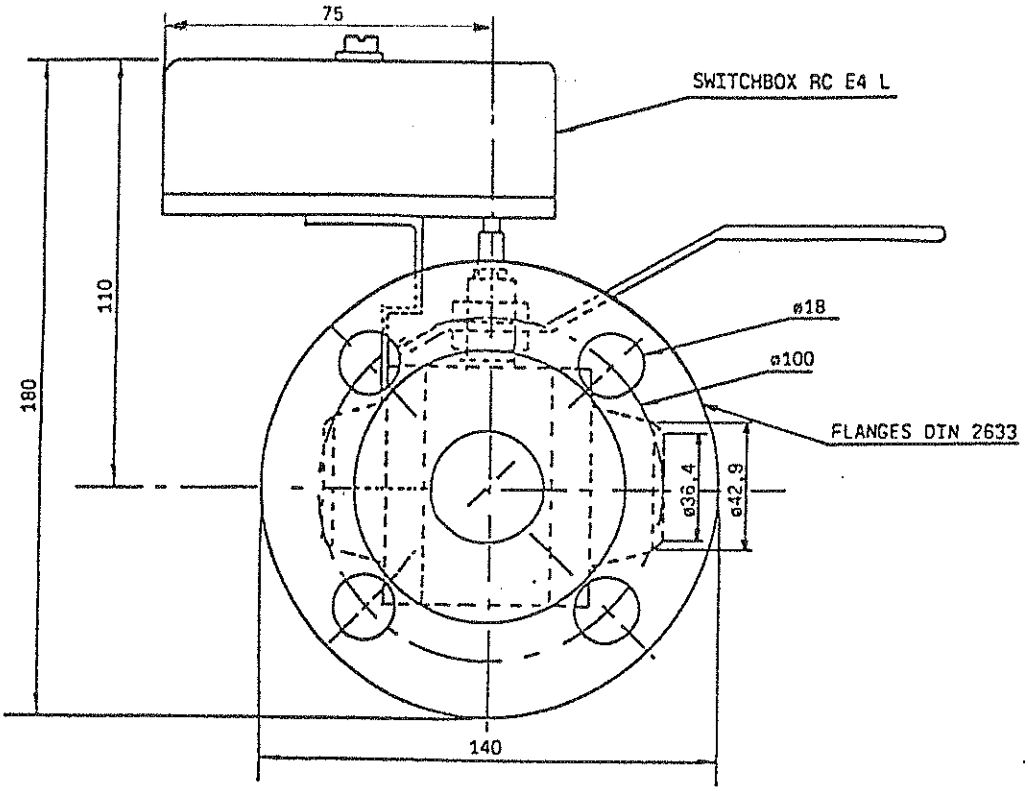


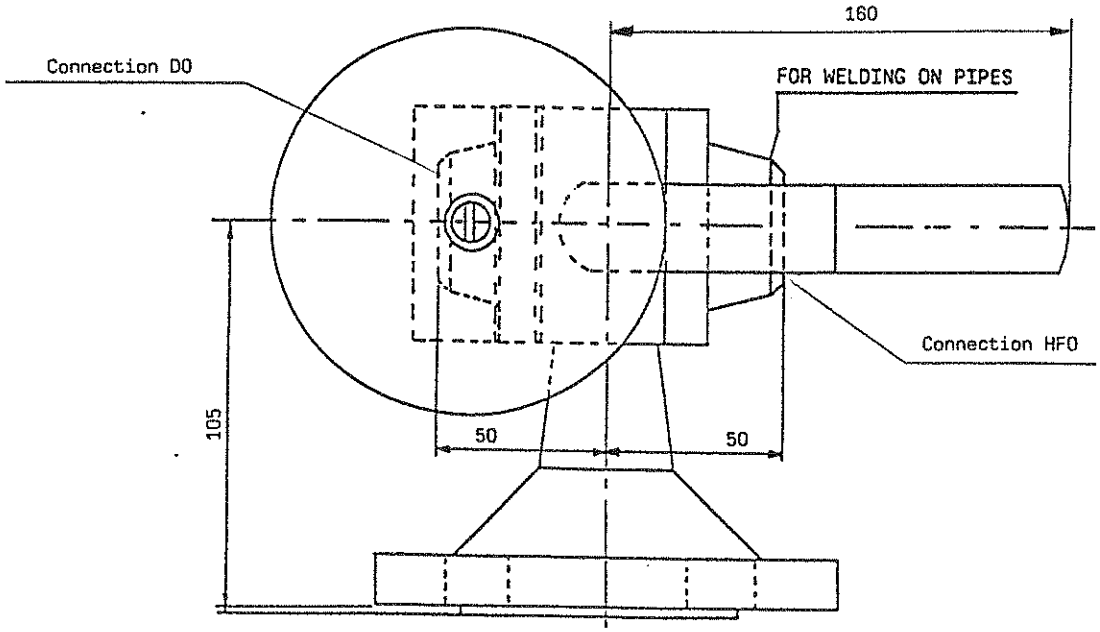
										Standard ends		Butt weld ends			Ends screwed gas			Ends screwed Briggs		
The used one	DN		L	L_1	L_2	C	D	H	D_2	POIDS kg	L_3	D_4	POIDS kg	L_4	D_5	POIDS kg	L_5	D_6	POIDS kg
	1/4"	8	64,4	20,4	123	45	10	37	14	0,500	9,5	14,2	0,430	13,5	1/4"	0,430	13,5	1/4"	0,430
	3/8"	10	64,4	20,4	123	45	12,6	37	17,2	0,500	9,5	17,6	0,430	13,5	3/8"	0,430	13,5	3/8"	0,430
	1/2"	15	72,5	24,5	123	52	16,2	39	21,4	0,870	9,5	21,8	0,800	16,5	1/2"	0,800	16,5	1/2"	0,800
	3/4"	20	85,4	31,4	160	60	20,6	53	27	1,200	11,1	27,4	1,100	17,5	3/4"	1,100	17,5	3/4"	1,100
	1"	25	99,3	41,3	160	68	26	58	34	1,600	12,7	34,2	1,700	20,5	1"	1,700	20,5	1"	1,700
	1 1/4"	32	110,4	48,4	195	76	31,7	71	42	2,600	14,3	43	2,400	20,5	1 1/4"	2,400	20,5	1 1/4"	2,400
	1 1/2"	40	126,3	56,3	195	88	40	76	49	3,400	15,9	49	3,400	24,5	1 1/2"	3,400	24,5	1 1/2"	3,400

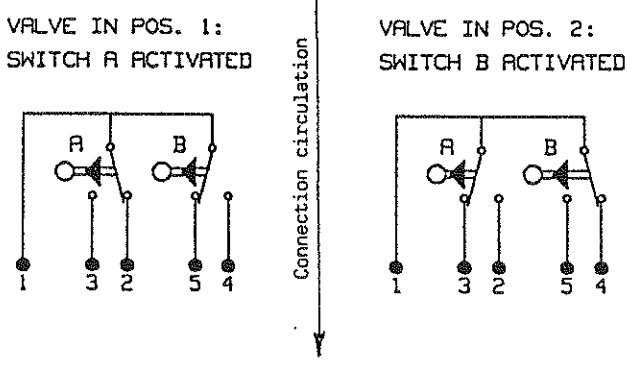
AALBORG INDUSTRIES

By – pass valve

Data Sheet
B : 3055.0



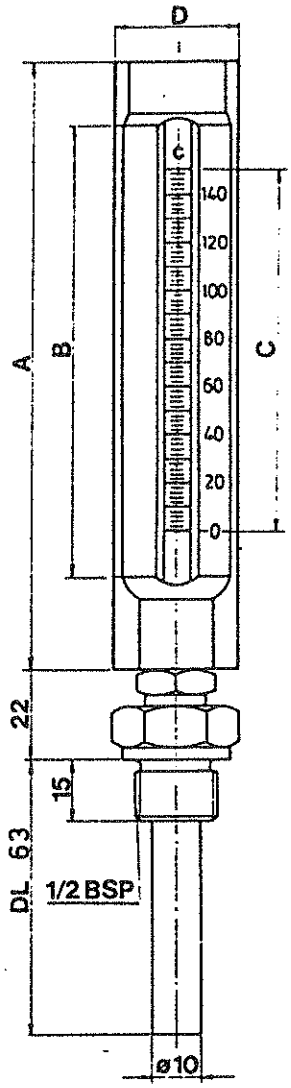




AALBORG INDUSTRIES

3-Way Ball Valve
Type 35 LH 411 L Bore DN 32
with RC E 4L

Data Sheet
B : 3070.0



Specifikation :

Gold anodized aluminium with contrasting numerals.

Glass capillary with blue liquid filling.

Size	A	B	C	D
150mm	150	110	90	30

Temperature range :

The used one	°C
→	0– +120
	0– +160

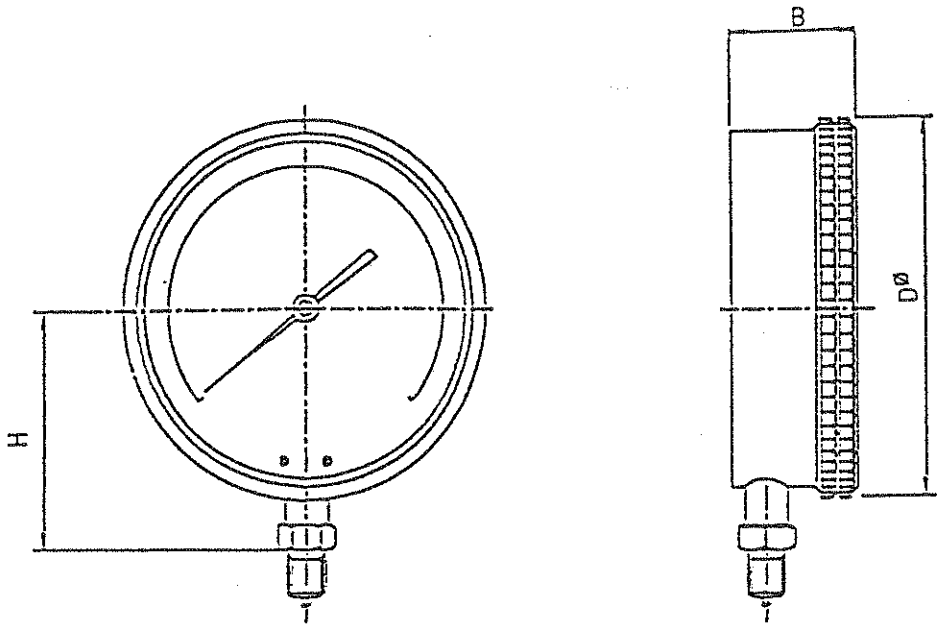
IBr NOV' 91

AALBORG INDUSTRIES

Thermometer

Data Sheet

B : 3010.0



The used one	DØ	H	B	Conn.	Scale
	80	73	30	3/8BSP	
→	100	87	38	3/8BSP	

MATERIAL :

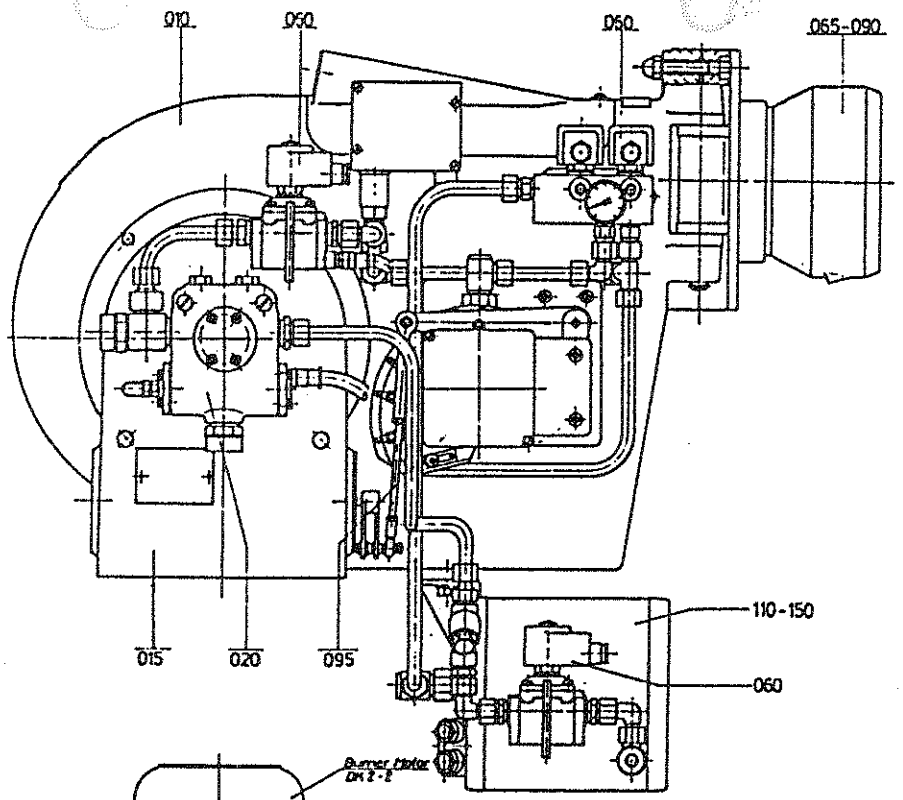
Case : Steel

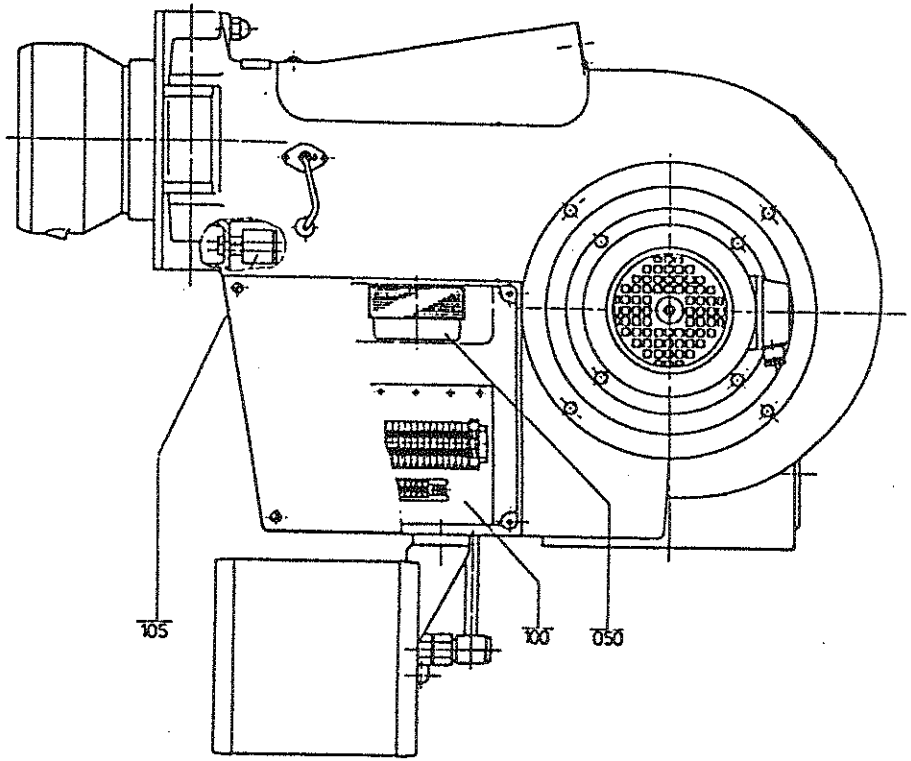
Measuring system : Copper alloy

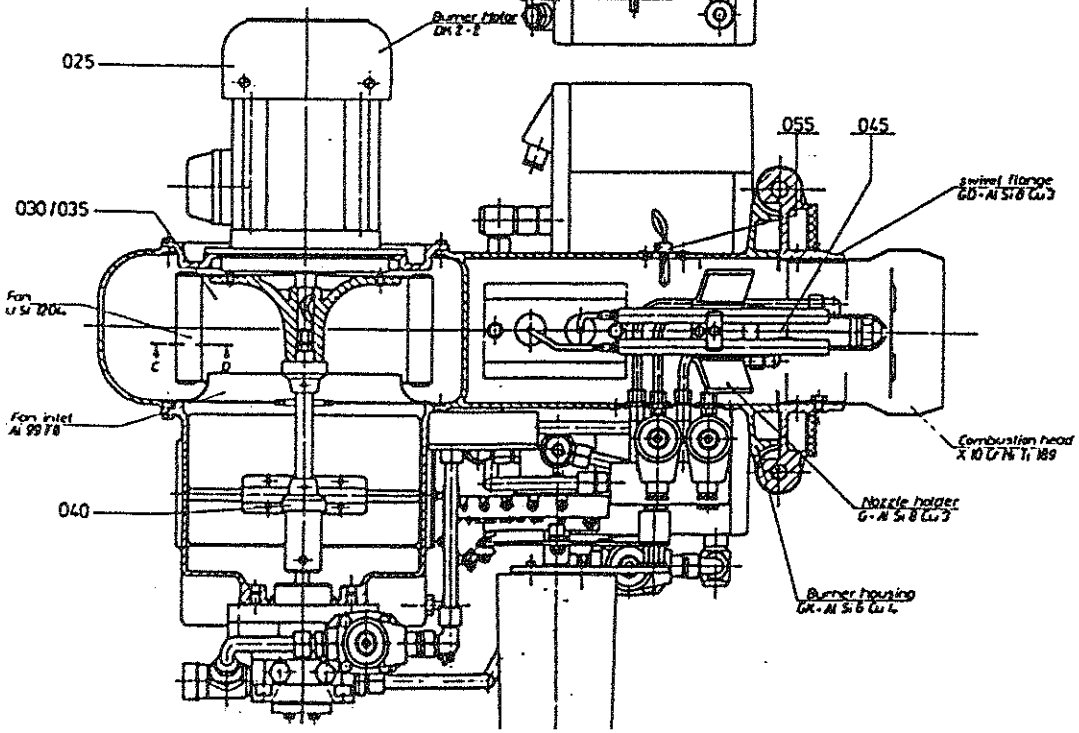
AALBORG
INDUSTRIES

3.0 Boiler/burner specification.

3.1	B: 3009.0	Dimension sketch
3.2		Burner plant





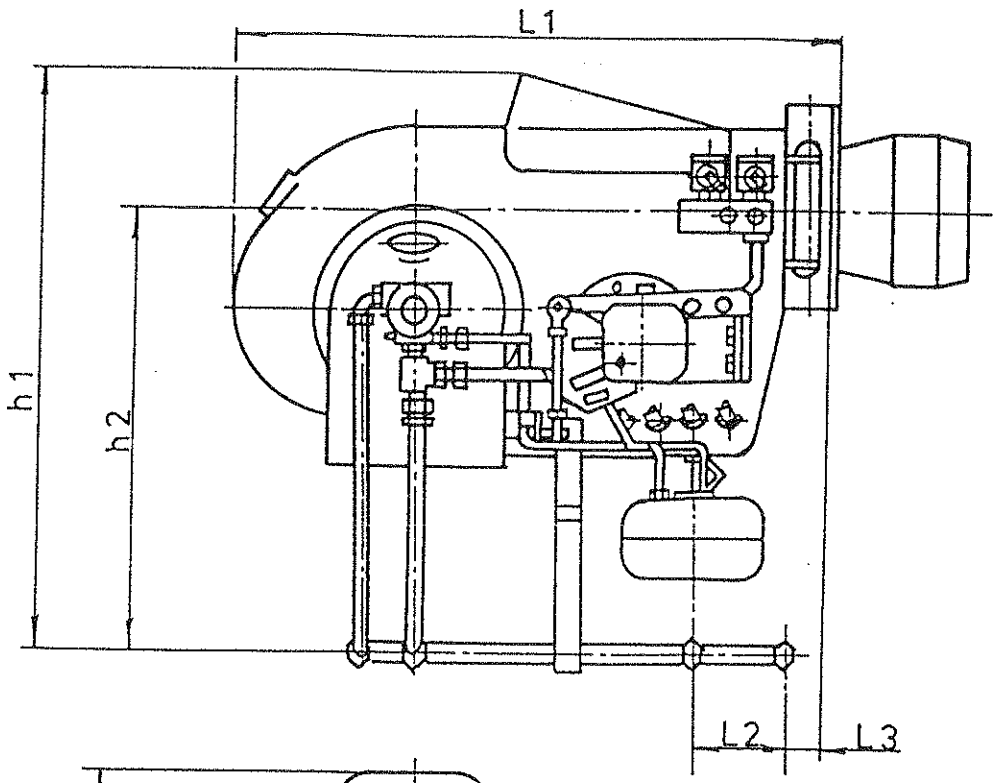


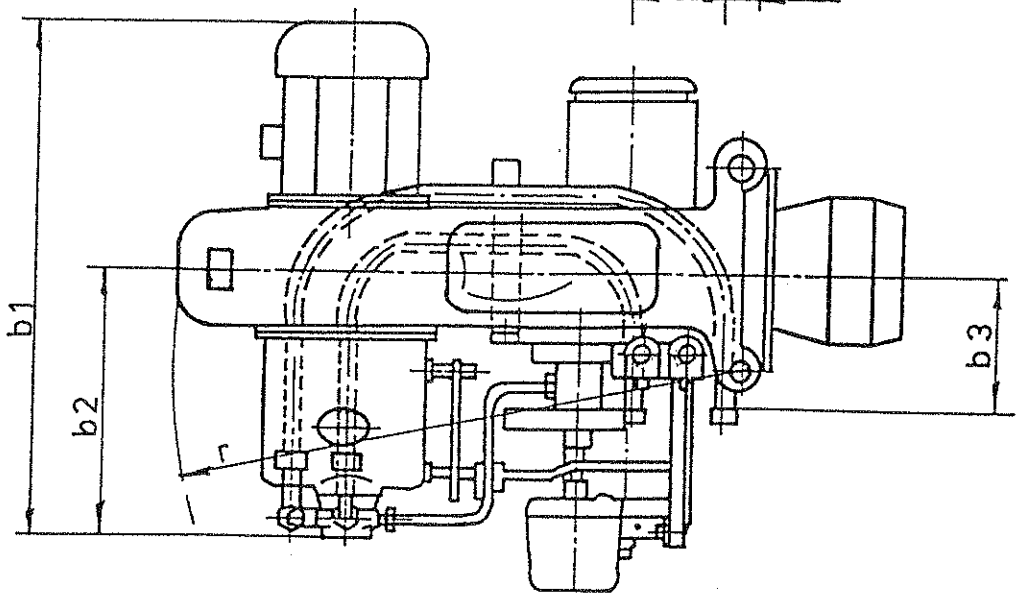
010	Burner casing
015	Air regulator
020	Pump TA 2
025	Burner motor DK 2-2
030/035	Blower wheel
040	Coupling
045	Nozzle assembly compl.
050	Ignition transformer
055	Flame supervision, Photo unit
060	Solenoid valve
065/090	Combustion head
095	Servo drive type SQM 10
100	Terminal strip RMS
105	Limit switch

Oilburner type RMS

Burner Plant

AALBORG





The used one	TYPE	h_1	h_2	b_1	b_2	b_3	l_1	l_2	l_3	r
	RMS 5	678	556	652	342	370	726	100	75	705
	RMS 7	791	650	730	395	535	789	120	90	760
	RMS 8	791	650	770	395	535	789	120	90	760
	RMS 8/2	825	650	770	395	535	791	120	90	760
→	RMS 9	980	790	870	445	555	960	120	100	1075
	RMS 10	980	790	870	445	555	945	120	100	1075
	RMS 11	1036	808	905	451	555	949	120	100	1075

AALBORG INDUSTRIES

Oil Burner
Type RMS 5 – RMS 11
Dimensioned sketch

Data Sheet
B : 3009.1
Page 1 of 1

AALBORG
INDUSTRIES

4.0 Electrical Equipment.

4.1	No. 01279	Wiring Diagram incl. of Indicators and set points.
4.2	B: 3001.1	Pressure switch, type RT 200
4.3	No. 7785	Oil Burner Control, type LOK 16
4.4	No. 7781	Flame detector relays, type LAE 10
4.5		Temperature controller, type CROw - 54 / 2
4.6		Controllers, type 6 DR 21 for:
		Thermal oil dump cooler Thermal fluid flow Load controller

BOILER CONTROL PANEL

ORDER NUMBER	:	00-735214 + 735216
CUSTOMER	:	KVAERNER WARNOW WERFT GMBH
NEWBUILDING	:	NEWB. NO. 26 + 27
FLUID OIL HEATER	:	TO-1
EXHAUST GAS HEATER	:	AO-1
OILBURNER	:	RMS 9
COMBUSTION OF	:	DIESEL OIL AND HEAVY FUEL OIL
POWER SUPPLY	:	440 VOLTS, 60 C/S
CONTROL VOLTAGE	:	220 VOLTS, 60 C/S
CLASSIFICATION	:	GL + AUT

"THE CONTROL PANEL IS CARRIED OUT ACCORDING TO VDE 0660 SECTION 5 AND THE SAFETY CIRCUITS ARE CARRIED OUT AND TESTED IN ACCORDANCE WITH DIN 57116"

		REV	DESCRIPTION	DATE	BY				
ENGINEERING	(35113-59374-00609)	1				SHEET	COVER SHEET		DRAWER NC
FIRM	AALBORG INDUSTRIES	2				REF	*	PAGE	PROJECT MPO
DESIGNATION	* T1850 + T1851	3				DRAWING NO	01279	001	DATE 16.05.2001
CUSTOMER	00-735214 + 735216	4							

CONTENTS

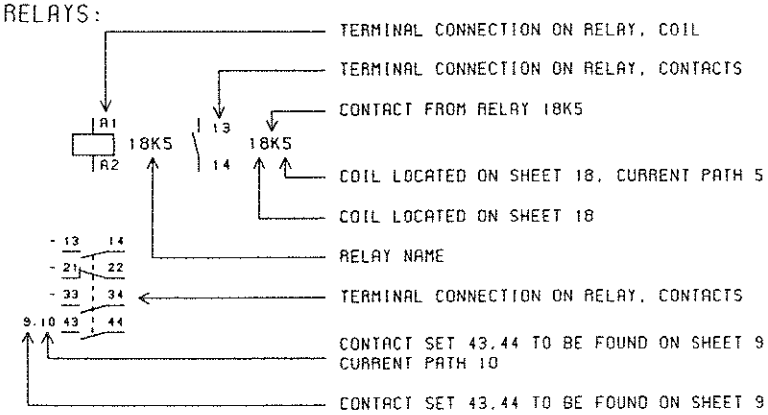
SHEET NO.	NAME
1	COVER SHEET
2	LIST OF CONTENTS
4,5	CONTROL PANEL LAY OUT
6,7,8,9	NAME PLATES
10,11	WIRING DIAGRAM POWER CIRCUIT
22,23,24,25,27,28,29,31,33,34,59,60,61,62,63,64,65,66,67,68,69,70,71,	WIRING DIAGRAM
72,75,76,80,81,82,83,84,85,86,88	
100,105,106,107,108,109,110,114,115	CONNECTION DIAGRAM
132,133,134	LIST OF PARTS

REVISIONS

SHEET NO.	INDEX	DATE	NAME

INTERPRETATION GUIDE :

RELAYS:



WIRING:

PURPLE — COLOURED INTERNAL WIRING, NORMAL, COMMON CABLE

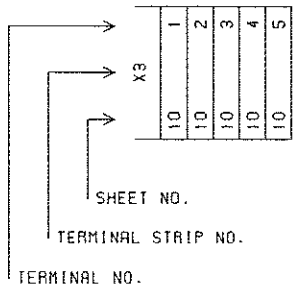
201 — INTERNAL WIRING, NORMAL, WITH IDENTIFICATION NUMBER

INTERNAL WIRING, SCREENED WIRING

INTERNAL WIRING, NORMAL WIRING

EXTERNAL WIRING

TERMINAL STRIPS:



WIRE COLOUR CODE:

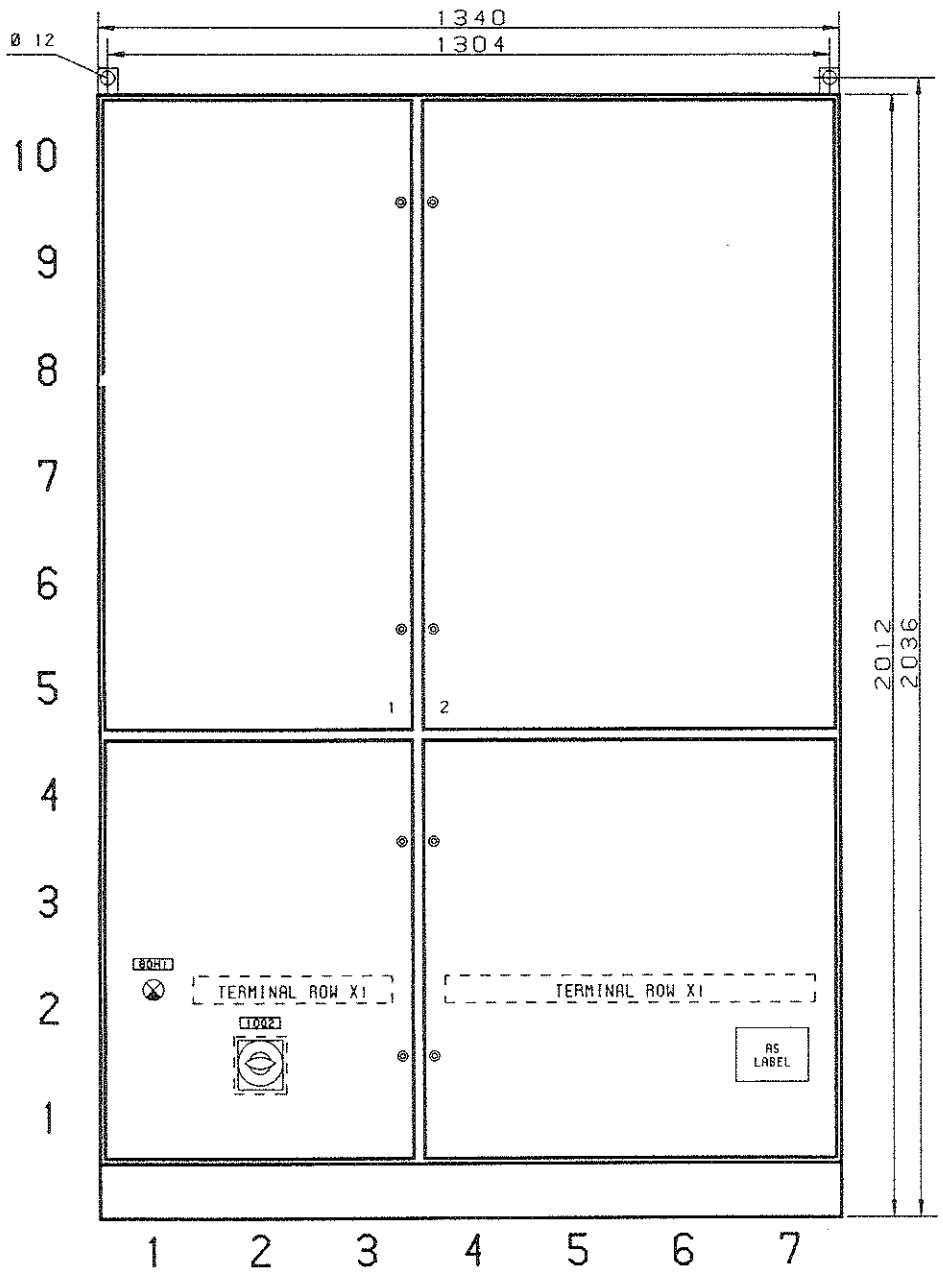
PURPLE	: COMMON 220V/110VAC (PHASE)
LIGHT BLUE	: COMMON 220V/110VAC (NEUTRAL)
RED	: 24VDC+
WHITE	: 0VDC
ORANGE	: LAMPTEST POTENTIAL
GREEN/YELLOW	: EARTH/GROUND
BLACK WITH NUMBERS	: INTERCONNECTING CABLE (220/110/24VAC)

COLOUR CODE SIGNAL LAMPS:

TERMINALS:

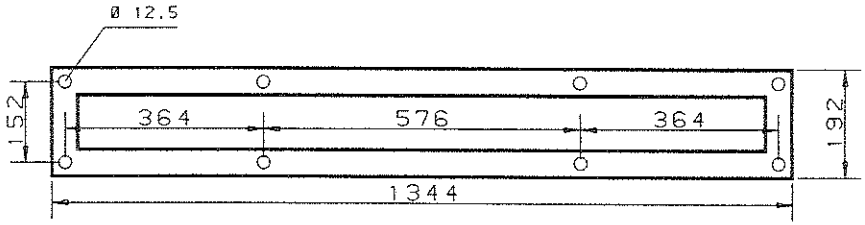
X1	NO.	TERMINALS IN CONTROL PANEL
X2	NO.	TERMINALS IN BURNER
X3	NO.	TERMINALS IN OIL PREHEATER
X4	NO.	TERMINALS IN SERVOMOTOR
X5	NO.	TERMINALS IN NOZZLE HEAD TEMPERATURE CONTROLLER
X6	NO.	
X7	NO.	
X8	NO.	

		REV	DESCRIPTION	DATE	BY				
ENGINEERING	(35113-59374-00609)	1				SHEET	LIST OF CONTENTS	DRAWER	NC
FIRM	AALBORG INDUSTRIES	2				REF	*	PAGE	002
DESIGNATION	* T1850 + T1851	3				DRAWING NO	01279	PROJECT	MPO
CUSTOMER	00-735214 + 735216	4						DATE	18.05.2001

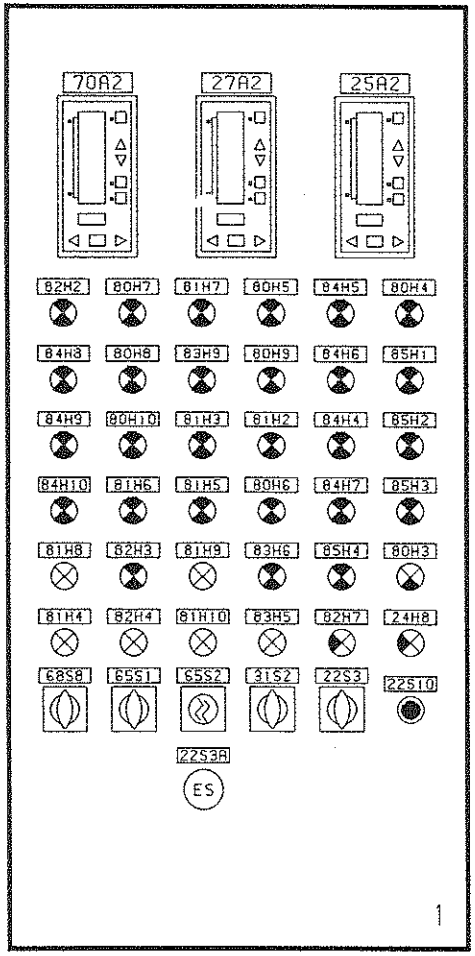


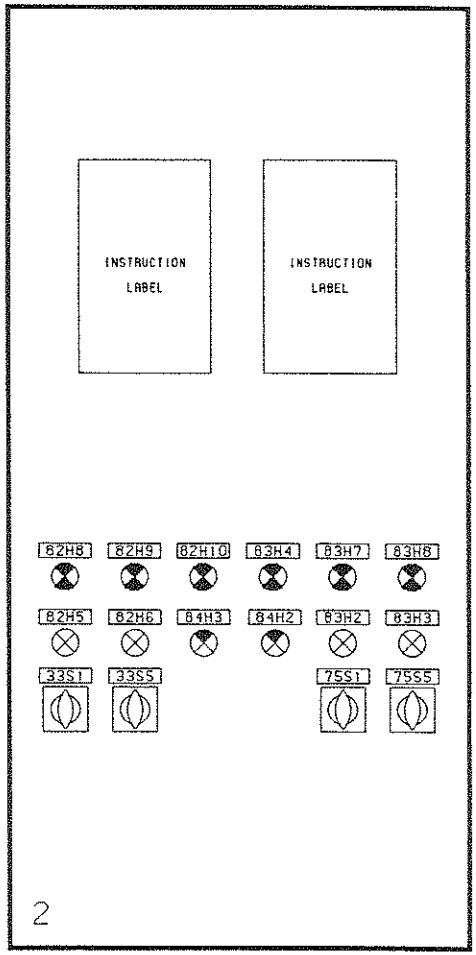
COLOUR : RAL 7035

PROTECTION : IP 44



ENGINEERING	(35113-59374-00609)	REV	DESCRIPTION	DATE	BY	SHEET	CONTROL PANEL	DRAWER	NC
FIRM	AALBORG INDUSTRIES	1				REF	*	PAGE	MPO
DESIGNATION	* T1850 + T1851	2						PROJECT	
		3						DATE	





		REV	DESCRIPTION	DATE	BY
ENGINEERING	(35113-59374-00609)	1			
FIRM	AALBORG INDUSTRIES	2			
DESIGNATION	* T1850 + T1851	3			
CUSTOMER	00-735214 + 735216	4			

SHEET	LAY OUT		DRAWER NC
REF	*	PAGE	PROJECT MPO
DRAWING NO	01279	005	DATE 18.05.2001

POS	TEXT TO BE ENGRAVED		TYPE/COLOR	POS	TEXT TO BE ENGRAVED	TYPE/COLOR
10Q2	MAIN SWITCH	OFF-ON	0-1	82H8	OVERLOAD THERMAL FLUID CIRCULATION PUMP 1	RED
22S10	LAMP TEST	PUSH BUTTON	BLACK	82H9	OVERLOAD THERMAL FLUID CIRCULATION PUMP 2	RED
22S3A	EMERGENCY STOP	PUSH BUTTON	YELLOW/RED	82H10	AUTO STAND BY THERMAL FLUID PUMP STARTED	RED
22S3	CONTROL VOLTAGE		OFF-ON/RESET			
31S2	FILLING PUMP		OFF-ON			
				83H2	FUEL OIL TRANSFER PUMP 1 ON	GREEN
33S1	THERMAL FLUID CIRCULATION PUMP 1		ST.BY/O/RUN	83H3	FUEL OIL TRANSFER PUMP 2 ON	GREEN
33S5	THERMAL FLUID CIRCULATION PUMP 2		ST.BY/O/RUN	83H4	AUTO STAND BY FUEL OIL TRANSFER PUMP STARTED	RED
				83H5	FILLING PUMP ON	GREEN
75S1	FUEL OIL TRANSFER PUMP 1		ST.BY/O/RUN	83H6	OVERLOAD FILLING PUMP	RED
75S5	FUEL OIL TRANSFER PUMP 2		ST.BY/O/RUN	83H7	OVERLOAD FUEL OIL TRANSFER PUMP 1	RED
				83H8	OVERLOAD FUEL OIL TRANSFER PUMP 2	RED
				83H9	LOW FUEL OIL PRESSURE IN SUPPLY LINE	RED
65S2	BURNER MODE	AUT/MAN	KEY OPERATED	84H2	DIESEL OIL OPERATION	BLUE
65S1	BURNER OPERATION MODE SELECTOR		SEE SHEET 65	84H3	HEAVY FUEL OIL OPERATION	BLUE
68S8	BURNER MODULATION MODE SELECTOR		SEE SHEET 68	84H4	HIGH EXHAUST GAS TEMPERATURE, EXHAUST GAS HEATER	RED
				84H5	BY PASS VALVE OPEN ON EXHAUST GAS HEATER	RED
				84H6	LEAKAGE CONTROL EXHAUST GAS FIRED HEATER	RED
80H1	SUPPLY ON		WHITE	84H7	QUICK CLOSING VALVE EXPANSION TANK ACTIVATED	RED
80H3	CONTROL VOLTAGE ON		WHITE	84H8	HIGH LEVEL IN EXPANSION TANK	RED
80H4	TOO HIGH FLUID OIL TEMPERATURE EXHAUST GAS HEATER		RED	84H9	LOW LEVEL IN EXPANSION TANK	RED
80H5	BY PASS VALVE OPEN ON OIL FIRED HEATER		RED	84H10	TOO LOW LEVEL IN EXPANSION TANK	RED
80H6	LOW FLOW THERMAL FLUID		RED			
80H7	LOW COMBUSTION AIR PRESSURE		RED			
80H8	LOW FUEL OIL PRESSURE IN RING LINE		RED	85H1	HIGH TEMP. THERMAL FLUID OIL FIRED HEATER OUTLET	RED
80H9	LEAKAGE CONTROL OIL FIRED HEATER		RED	85H2	LOW TEMPERATURE IN THERMAL FLUID OIL FIRED HEATER	RED
80H10	HIGH FUEL OIL PRESSURE IN BURNER RETURN LINE		RED	85H3	HIGH TEMPERATURE IN COILS AT OIL FIRED HEATER	RED
				85H4	LOW FUEL OIL TEMPERATURE IN SUPPLY LINE	RED
81H2	HIGH EXHAUST GAS TEMPERATURE OIL FIRED HEATER		RED			
81H3	HIGH FUEL OIL TEMPERATURE		RED	24H8	QUICK CLOSING VALVE EXPANSION TANK OPEN	YELLOW
81H4	PREHEATER ON		GREEN			
81H5	LOW FUEL OIL TEMPERATURE		RED			
81H6	BURNER SWING OUT		RED			
81H7	FUEL OIL QUICK CLOSING VALVES CLOSED		RED			
81H8	SAFETY INTERLOCKS OK		GREEN			
81H9	AUTOMATIC OPERATION		GREEN			
81H10	MANUAL OPERATION		GREEN			
82H2	FLAME FAILURE		RED			
82H3	BURNER MOTOR OVERLOAD		RED			
82H4	BURNER MOTOR ON		GREEN			
82H5	THERMAL FLUID CIRCULATION PUMP 1 ON		GREEN			
82H6	THERMAL FLUID CIRCULATION PUMP 2 ON		GREEN			
82H7	SET POINT - NORMAL BURNER STOP		YELLOW			

ENGINEERING	(35113-59374-00609)
FIRM	AALBORG INDUSTRIES
DESIGNATION	x T1850 ÷ T1851

REV	DESCRIPTION	DATE	BY
1			
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3			

SHEET	NAME PLATES		DRAWER NC
REF	*	PAGE	PROJECT MPO
DRAWING NO	01279	006	DATE

1	2	3	4	5	6	7	8	9	10
POS	TEXT TO BE ENGRAVED			TYPE/COLOR	POS	TEXT TO BE ENGRAVED			TYPE/COLOR
10Q5	PREHEATER	MAX. 18,1A		CIRCUIT BREAKER					
10Q6	BURNER MOTOR	MAX. 13.5A		CIRCUIT BREAKER					
10F7	CONTROL VOLTAGE 220V	MAX. 6A		CIRCUIT BREAKER					
10Q8	TRANSFORMER SUPPLY 440/220/24V	MAX. 6,3A		CIRCUIT BREAKER					
10F9	PILOT VOLTAGE/PILOT LAMPS 24V	MAX. 4A		CIRCUIT BREAKER					
11Q2	THERMAL FLUID CIRCULATION PUMP 1	MAX. 40.5A		CIRCUIT BREAKER					
11Q3	THERMAL FLUID CIRCULATION PUMP 2	MAX. 40.5A		CIRCUIT BREAKER					
11Q5	FUEL OIL TRANSFER PUMP 1	MAX. 1,2A		CIRCUIT BREAKER					
11Q6	FUEL OIL TRANSFER PUMP 2	MAX. 1,2A		CIRCUIT BREAKER					
11Q8	FILLING PUMP	MAX. 4,65A		CIRCUIT BREAKER					
25A2	DUMP COOLER CONTROLLER			SIPART					
27A2	THERMAL FLUID OIL FLOW CONTROLLER			SIPART					
70A2	LOAD CONTROLLER			SIPART					

ENGINEERING	(35113-59374-00609)
FIRM	AALBORG INDUSTRIES
DESIGNATION	* T1850 + T1851
CUSTOMER	00-735214 + 735216

REV	DESCRIPTION	DATE	BY
1			
2			
3			
4			

SHEET	NAME PLATES		DRAWER NC
REF	*	PAGE	PROJECT MPO
DRAWING NO	01279	007	DATE 18.05.2001

POS	TEXT TO BE ENGRAVED		TYPE/COLOR	POS	TEXT TO BE ENGRAVED	TYPE/COLOR
10Q2	HAUPTSCHALTER	AUS-EIN	0-1	82H8	UBERLAST THERMALÖL ZIRKULATIONSPUMPE 1	ROT
22S10	LAMPENTEST	DRUCKSCHALTER	SCHWARZ	82H9	UBERLAST THERMALÖL ZIRKULATIONSPUMPE 2	ROT
22S3A	NOT AUS	DRUCKSCHALTER	GELB/ROT	82H10	AUTO STAND BY THERMALÖL ZIRKULATIONSPUMPE EIN	ROT
22S3	STEUERSPANNUNG		AUS-EIN/RESET			
31S2	FULL-/ENTLEERUNGSPUMPE		AUS-EIN			
				83H2	ÖLFÖRDERPUMPE 1 EIN	GRUN
33S1	THERMALÖL ZIRKULATIONSPUMPE 1		ST.BY/O/RUN	83H3	ÖLFÖRDERPUMPE 2 EIN	GRUN
33S5	THERMALÖL ZIRKULATIONSPUMPE 2		ST.BY/O/RUN	83H4	AUTO STAND BY ÖLFÖRDERPUMPE EIN	ROT
				83H5	FULL-/ENTLEERUNGSPUMPE BETRIEB	GRUN
75S1	ÖLFÖRDERPUMPE 1		ST.BY/O/RUN	83H6	UBERLAST FÜLL-/ENTLEERUNGSPUMPE	ROT
75S5	ÖLFÖRDERPUMPE 2		ST.BY/O/RUN	83H7	UBERLAST ÖLFÖRDERPUMPE 1	ROT
				83H8	UBERLAST ÖLFÖRDERPUMPE 2	ROT
				83H9	ÖLDRUCK IN DER VERSORGUNGSLEITUNG NIEDRIG	ROT
65S2	BRENNER MODE	AUT/MAN	SCHLÜSSEL	84H2	DIESELÖLBETRIEB	BLAU
65S1	WAHLSCHALTER FÜR BRENNERBETRIEBSART		SIEHE SEITE 65	84H3	SCHWERÖLBETRIEB	BLAU
68S8	WAHLSCHALTER FÜR BRENNERMODULATIONSART		SIEHE SEITE 68	84H4	ABGASTEMPERATURE HOCH ABGAS ERHITZER	ROT
				84H5	BY PASS VENTILE ABGAS ERHITZER GEÖFFNET	ROT
				84H6	LECKAGE ABGAS ERHITZER	ROT
80H1	SPANNUNG EIN		WEISS	84H7	SCHNELLABSPERVENTILE EXPANSION TANK WIRKSAME	ROT
80H3	STEUERSPANNUNG EIN		WEISS	84H8	ÖLSTAND HOCH EXPANSION TANK	ROT
80H4	THERMALÖL TEMPERATURE ZU HOCH IN ABGAS ERHITZER		ROT	84H9	ÖLSTAND NIEDRIG EXPANSION TANK	ROT
80H5	BY PASS VENTILE ÖLGEFEURTEN ERHITZER GEÖFFNET		ROT	84H10	ÖLSTAND ZU NIEDRIG EXPANSION TANK	ROT
80H6	THERMALÖL DURCHFLUSS NIEDRIG		ROT			
80H7	MANGEL AM VERBRENNUNGSLUFT		ROT			
80H8	ÖLDRUCK IN DER NIEDRIG BRENNERRINGLEITUNG		ROT	85H1	THERMALÖL TEMPERATURE HOCH IN ÖLGEFEURTEN ERHITZER	ROT
80H9	LECKAGE ÖLGEFEURTEN ERHITZER		ROT	85H2	THERMALÖL TEMPERATURE NIEDRIG IN ÖLGEFEURTEN ERHITZER	ROT
80H10	ÖLDRUCK IN DER BRENNERRUCKLEITUNG HOCH		ROT	85H3	TEMPERATURE ROHRSYSTEM HOCH IN ÖLGEFEURTEN ERHITZER	ROT
				85H4	ÖLTEMPERATURE IN DER VERSORGUNGSLEITUNG NIRDRIG	ROT
81H2	ABGASTEMPERATURE HOCH ÖLGEFEURTEN ERHITZER		ROT			
81H3	SCHWERÖL TEMPERATURE HOCH		ROT	24H8	SCHNELLABSPERVENTILE EXPANSION TANK GEÖFFNET	GELB
81H4	VORWARMER		GRUN			
81H5	SCHWERÖL TEMPERATURE NIRDRIG		ROT			
81H6	BRENNERVERRIEGELLUNG		ROT			
81H7	SCHNELLABSPERVENTILE BRENNER ÖL GESCHLOSSEN		ROT			
81H8	SICHERHEITSABSCHALTUNGEN OK		GRUN			
81H9	AUTOMATISCHER BETRIEB		GRUN			
81H10	HANDBETRIEB		GRUN			
82H2	FLAMMENFEHLER/-AUSFALL		ROT			
82H3	UBERLAST BRENNERMOTOR		ROT			
82H4	BRENNERMOTOR BETRIEB		GRUN			
82H5	THERMALÖL ZIRKULATIONSPUMPE 1 EIN		GRUN			
82H6	THERMALÖL ZIRKULATIONSPUMPE 2 EIN		GRUN			
82H7	SOLLWERT - BRENNER STOPP		GELB			

ENGINEERING	(35113-59374-00609)
FIRM	AALBORG INDUSTRIES
DESIGNATION	* T1850 + T1851
CUSTOMER	00-735214 + 735216

REV	DESCRIPTION	DATE	BY
1			
2			
3			
4			

SHEET	NAME PLATES		DRAWER NC
REF	*	PAGE 008	PROJECT MPO
DRAWING NO	01279		DATE 08.05.2001

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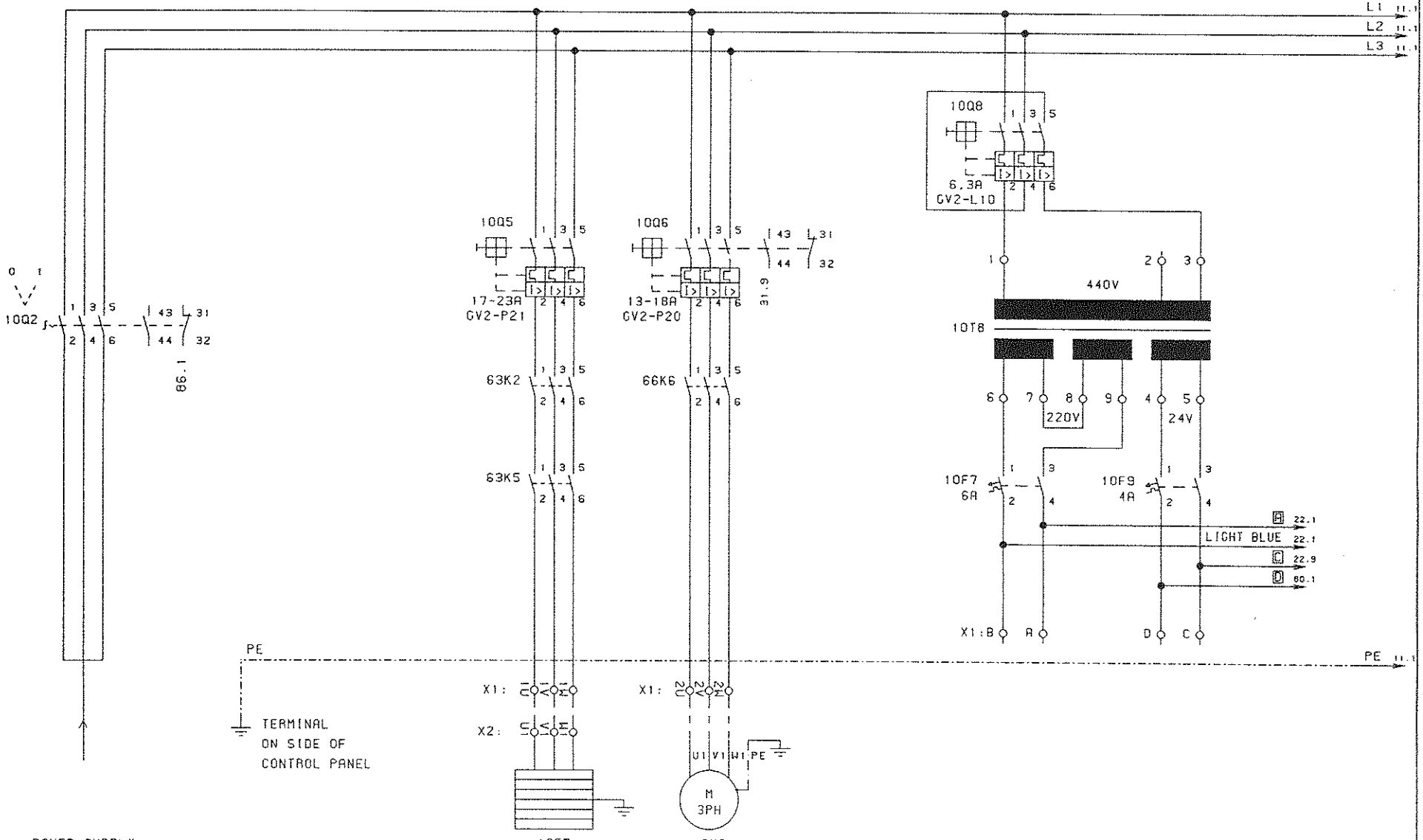
POS	TEXT TO BE ENGRAVED			TYPE/COLOR	POS	TEXT TO BE ENGRAVED			TYPE/COLOR
10Q5	VORWARMER	MAX.	18,1A						
10Q6	BRENNEMOTOR	MAX.	13,5A						
10F7	STEUERSPANNUNG 220V	MAX.	6A						
10Q8	TRANSFORMATOR VERSORGUNG	MAX.	6,3A						
10F9	KONTROLL-LAMPE VERSORGUNG	MAX.	4A						
11Q2	THERMALOL ZIRKULATIONSPUMPE 1	MAX.	40,5A						
11Q3	THERMALOL ZIRKULATIONSPUMPE 2	MAX.	40,5A						
11Q5	OLFORDERPUMPE 1	MAX.	1,2A						
11Q6	OLFORDERPUMPE 2	MAX.	1,2A						
11Q8	FULL-/ENTLEERUNGSPUMPE	MAX.	4,65A						
25A2	UBER PRODUKTIONS KUHLER								
27A2	DURCHFLUSSWACHTER FUR THERMALOL								
70A2	BRENNERLAST REGLER								

ENGINEERING	(35113-59374-00609)	REV	DESCRIPTION	DATE	BY
FIRM	AALBORG INDUSTRIES	1			
DESIGNATION	* T1850 + T1851	2			
CUSTOMER	00-735214 + 735216	3			
		4			

SHEET	NAME PLATES		DRAWER NC
REF	*	PAGE	PROJECT MPO
DRAWING NO	01279	009	DATE 18.05.2001



POWER SUPPLY
3x440V 60Hz
POWER CONSUMPTION
APP. 52KW, 82A

THERMAL OVERLOAD SET=IN

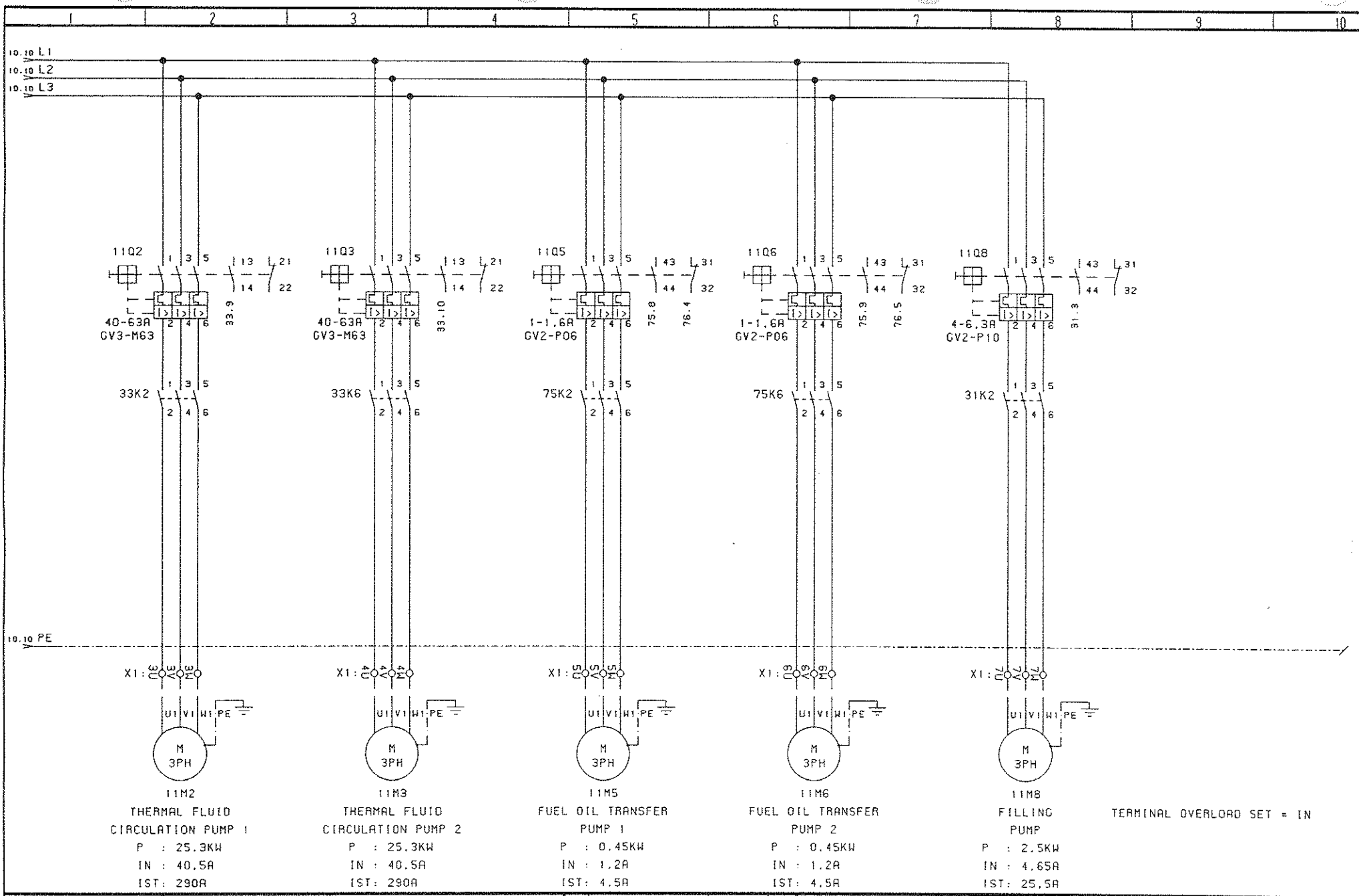
10E5
PREHEATER
P : 13.8KW
IN : 18.1A

10M6
BURNER MOTOR
P : 7.5KW
IN : 13.5A
IST: 81A

TRANSFORMER
CONTROL VOLTAGE

		REV	DESCRIPTION	DATE	BY
ENGINEERING	(35113-59374-00609)	1			
FIRM	AALBORG INDUSTRIES	2			
DESIGNATION	* T1850 + T1851	3			
CUSTOMER	00-735214 + 735216	4			

SHEET	POWER CIRCUIT		DRAWER NC
REF	*	PAGE	PROJECT MPO
DRAWING NO	01279	010	DATE 18 05 2001



ENGINEERING	(35113-59374-00609)
FIRM	AALBORG INDUSTRIES
DESIGNATION	* T1850 + T1851
CUSTOMER	00-735214 + 735216

REV	DESCRIPTION	DATE	BY
1			
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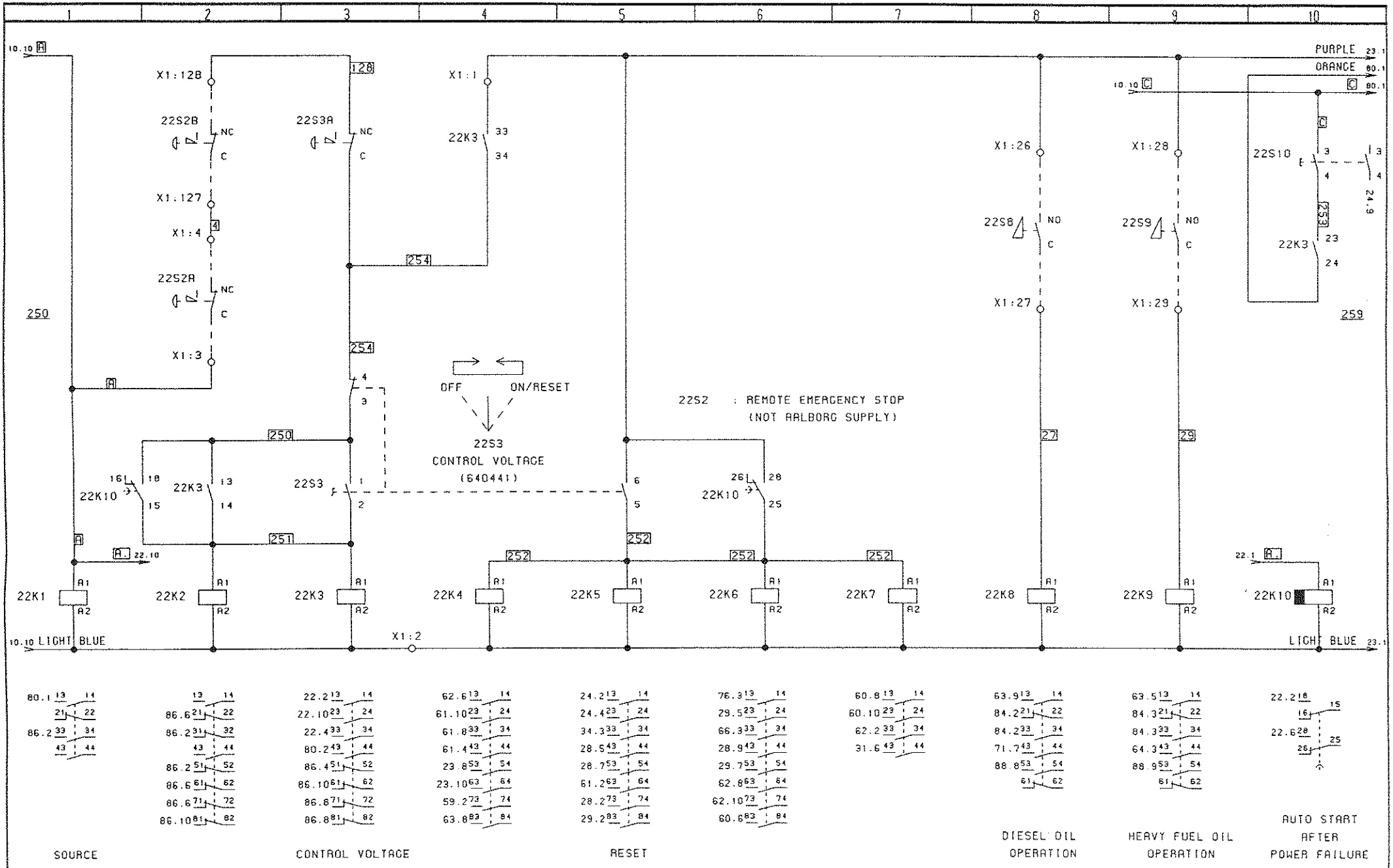
3			

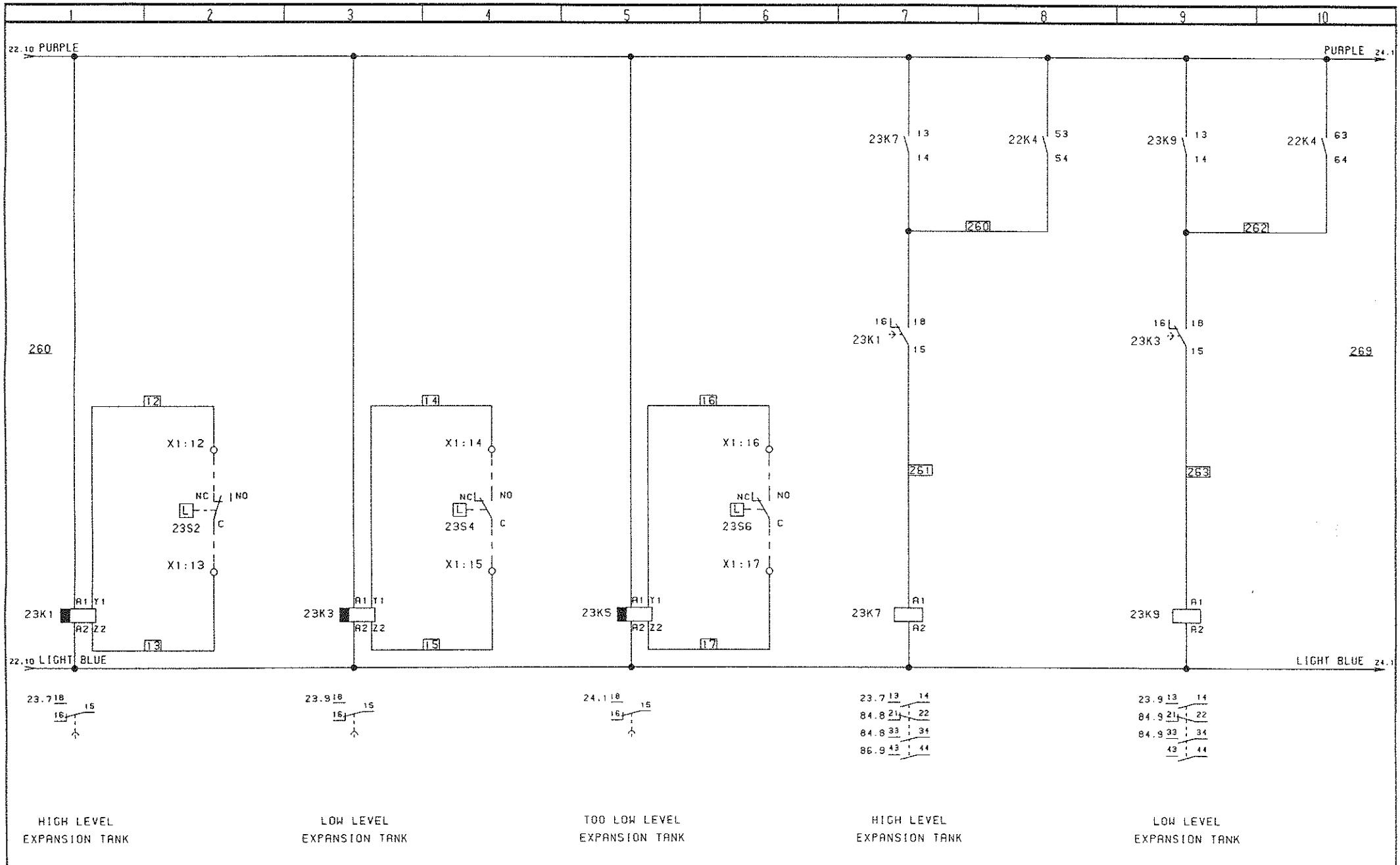
SHEET	POWER CIRCUIT		DRAWER NC
REF	*	PAGE	PROJECT MPO
DRAWING NO	01279	011	DATE 18.05.2001



ENGINEERING	(35113-59374-00609)
FIRM	AALBORG INDUSTRIES
DESIGNATION	* T1850 + T1851

REV	DESCRIPTION	DATE	BY
1			
2			
3			

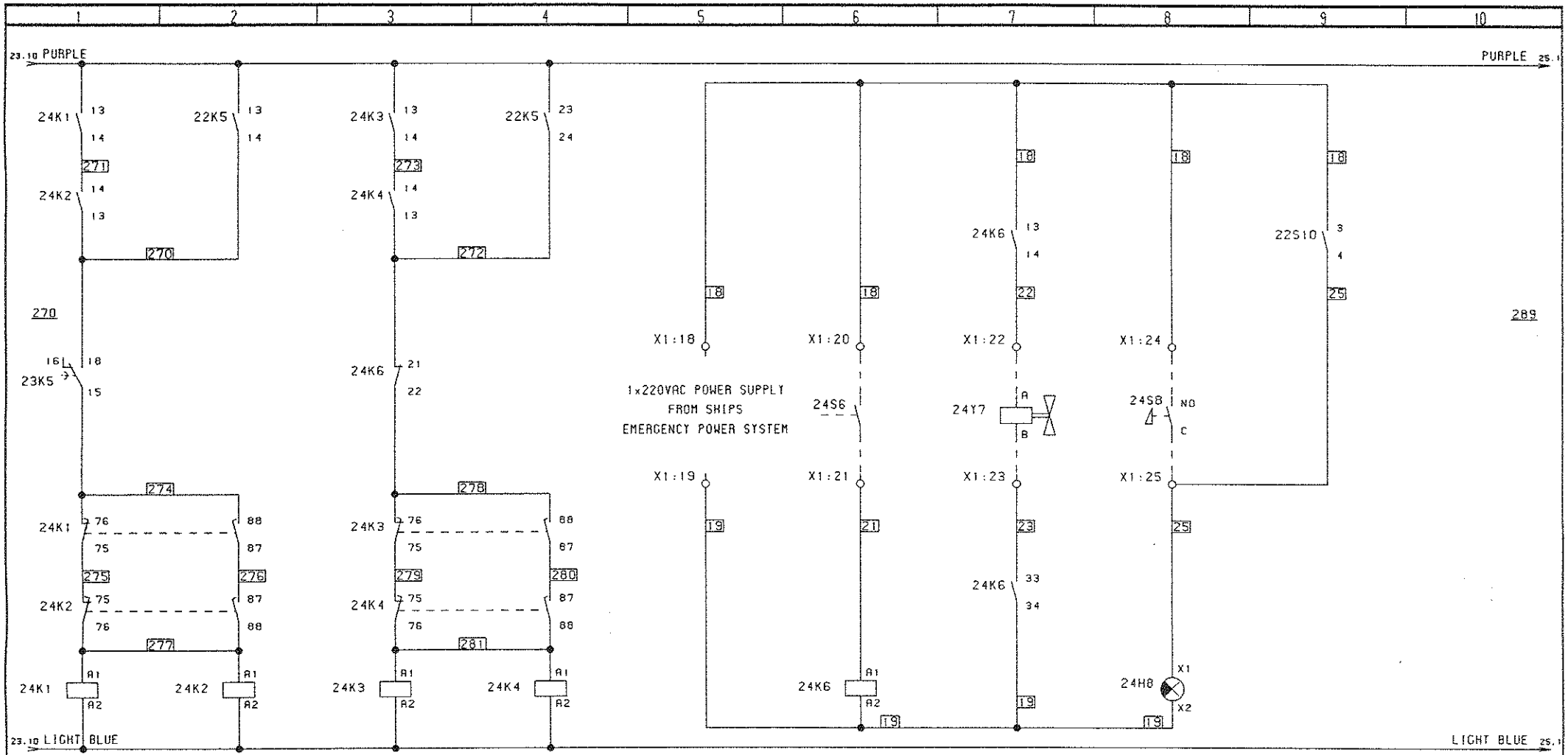
SHEET	WIRING DIAGRAM		DRAWER NC
REF	*	PAGE 022	PROJECT MPO
	01279		DATE



ENGINEERING	(35113-59374-00609)
FIRM	AALBORG INDUSTRIES
DESIGNATION	* T1850 , T1851

REV	DESCRIPTION	DATE	BY
1			
2			
3			

SHEET	WIRING DIAGRAM		DRAWER NC
REF	*	PAGE 023	PROJECT MPO
DRAWING NO	01279		DATE 18 DE 2001



TOO LOW LEVEL
EXPANSION TANK

QUICK CLOSING VALVE ACTIVATED
(BURNER STOP AND THERMAL FLUID PUMPS STOP)

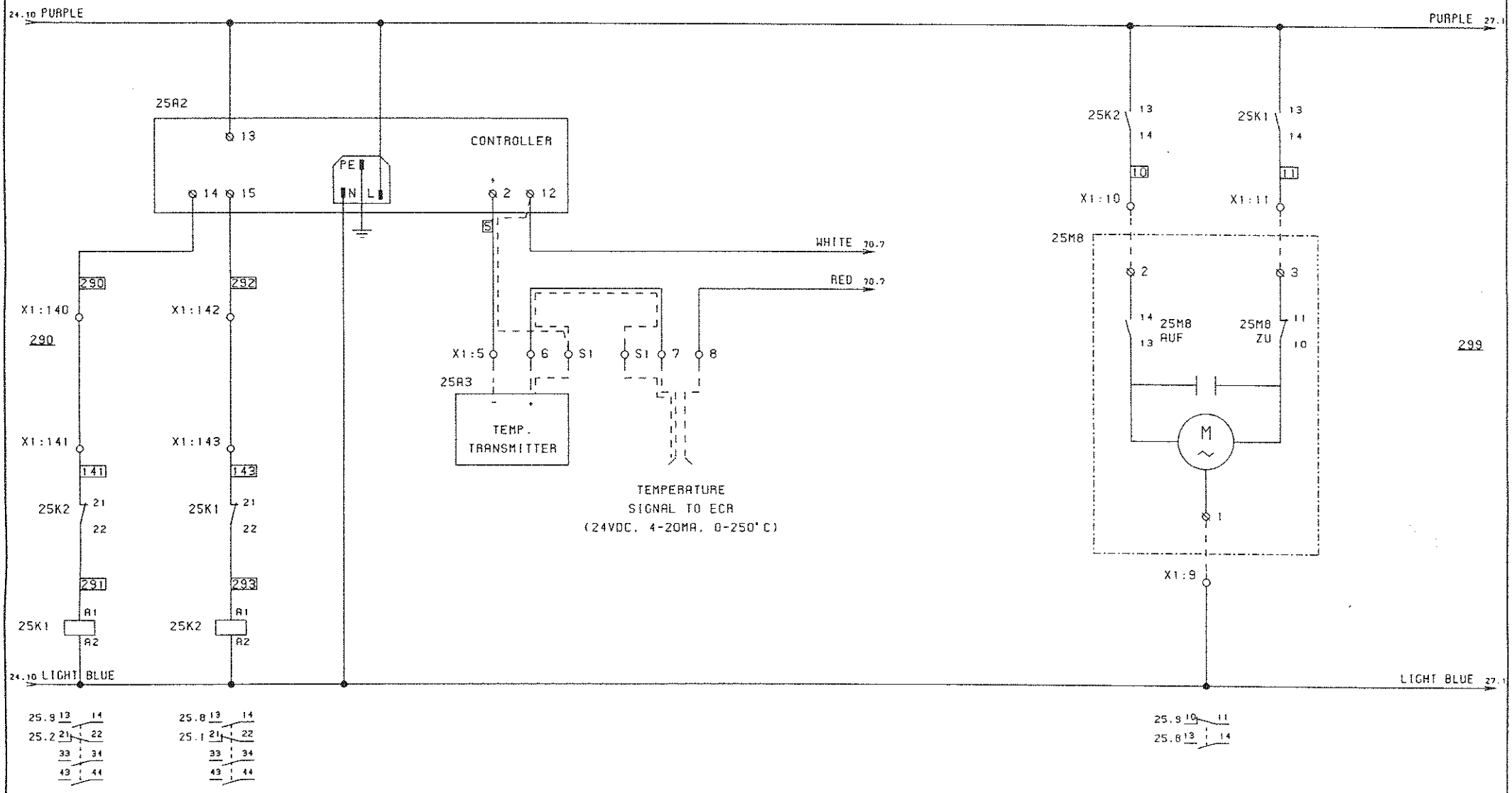
PILOT VALVE FOR
QUICK CLOSING
VALVE ON
EXPANSION TANK

QUICK CLOSING
VALVE OPEN

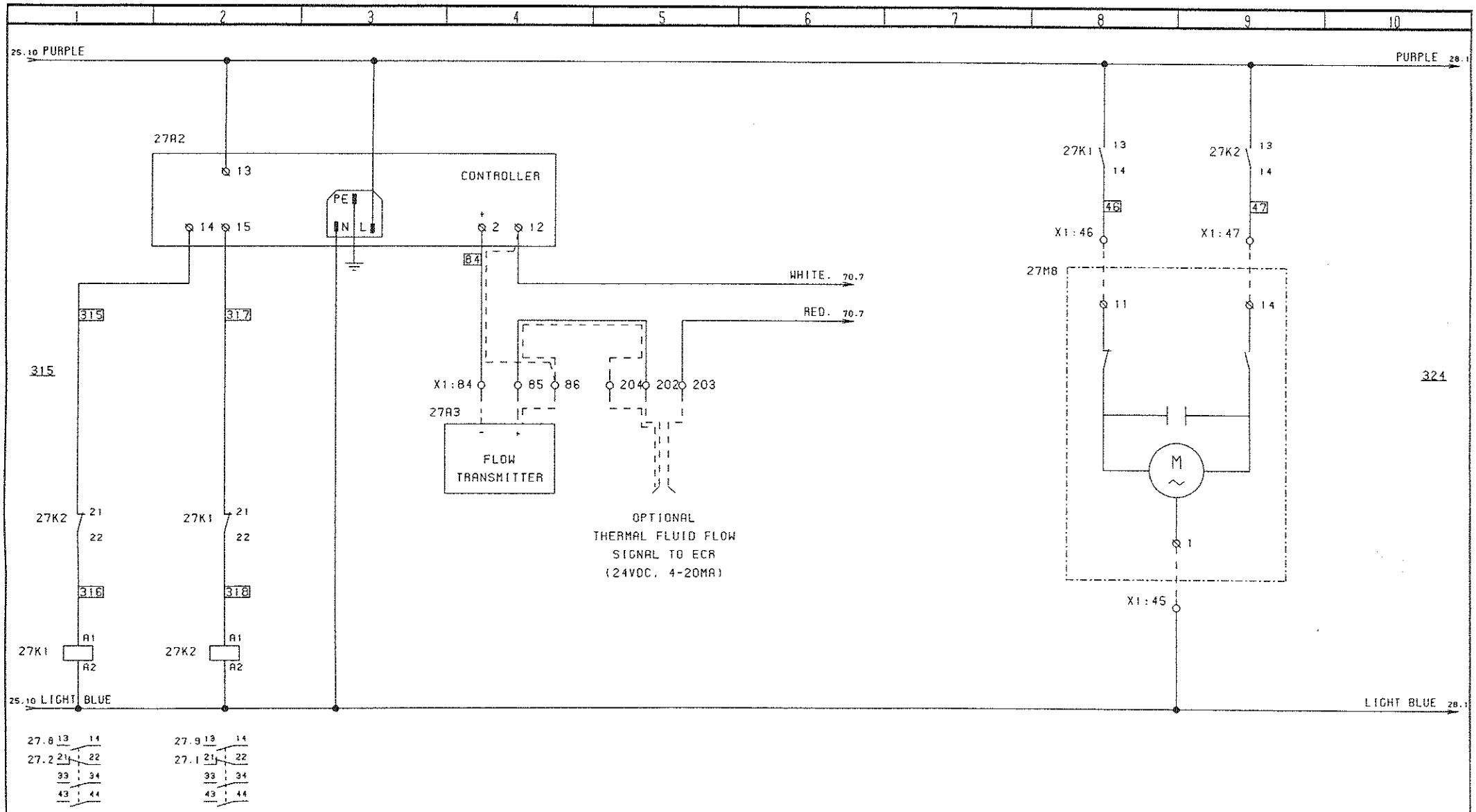
24S6 : REMOTE CONTROL SWITCH EXPANSION TANK
24S6:(NOT AALBORG SUPPLY)

24S6 : LIMIT SWITCH ON QUICK CLOSING VALVE
(CONTACT OPEN WHEN VALVE IS FULLY CLOSED)

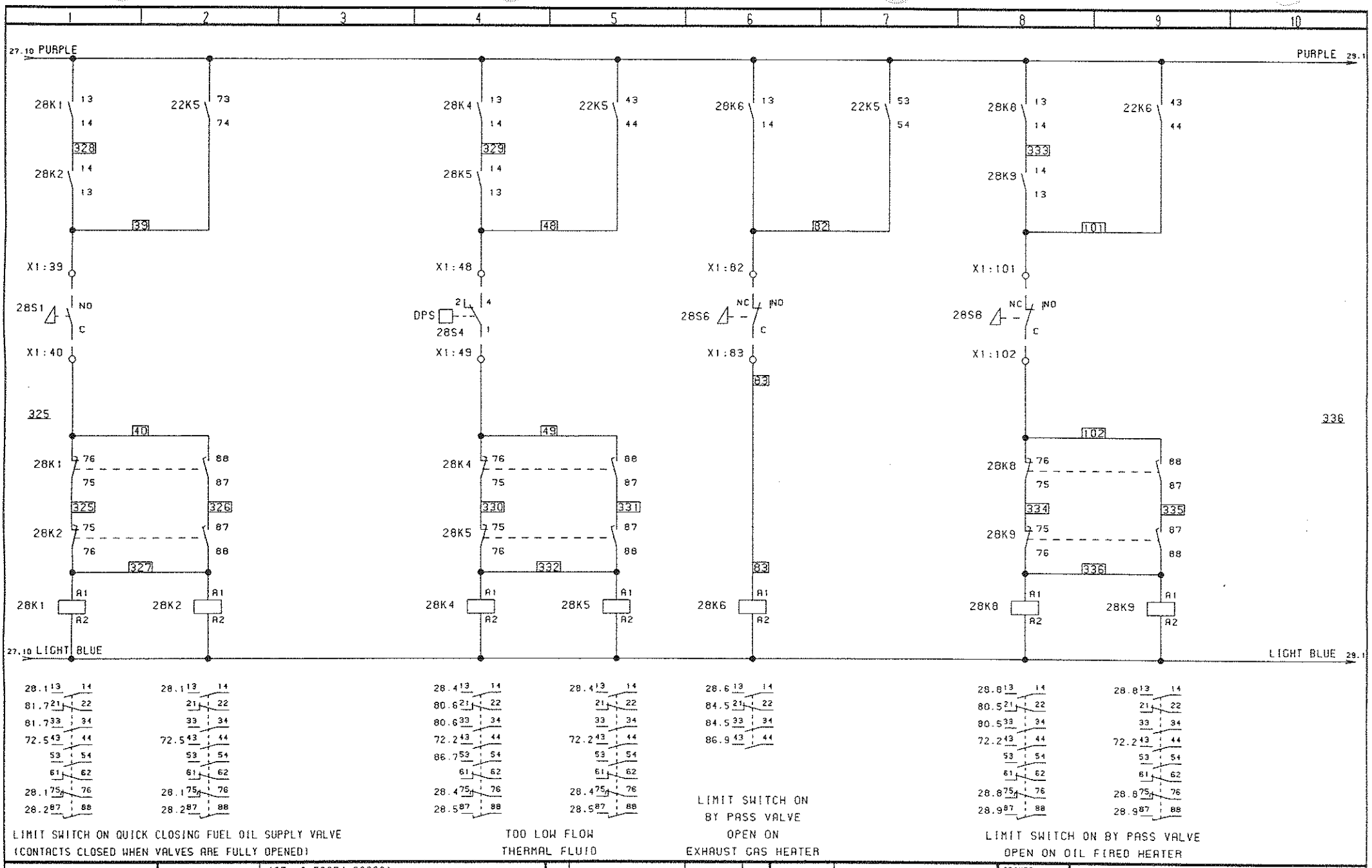
ENGINEERING	(35113-59374-00609)	REV	DESCRIPTION	DATE	BY	SHEET	WIRING DIAGRAM	DRAWER NC
FIRM	AALBORG INDUSTRIES	1				REF	*	PROJECT MPO
DESIGNATION	* T1850 + T1851	2				PAGE	024	
		3				DRAWING NO	01279	DATE 18.05.2001



ENGINEERING	(35113-59374-00609)	REV	DESCRIPTION	DATE	BY	SHEET	WIRING DIAGRAM		DRAWER NC
FIRM	AALBORG INDUSTRIES	1							
DESIGNATION	* T1850 + T1851	2				REF	*	PAGE	PROJECT MPO
		3							



ENGINEERING	(35113-59374-00609)	REV	DESCRIPTION	DATE	BY	SHEET	WIRING DIAGRAM	DRAWER	NC
FIRM	AALBORG INDUSTRIES	1							
DESIGNATION	* T1850 ; T1851	2				REF	*	PAGE	
		3					01279		027
								PROJECT	MPO
								DATE	



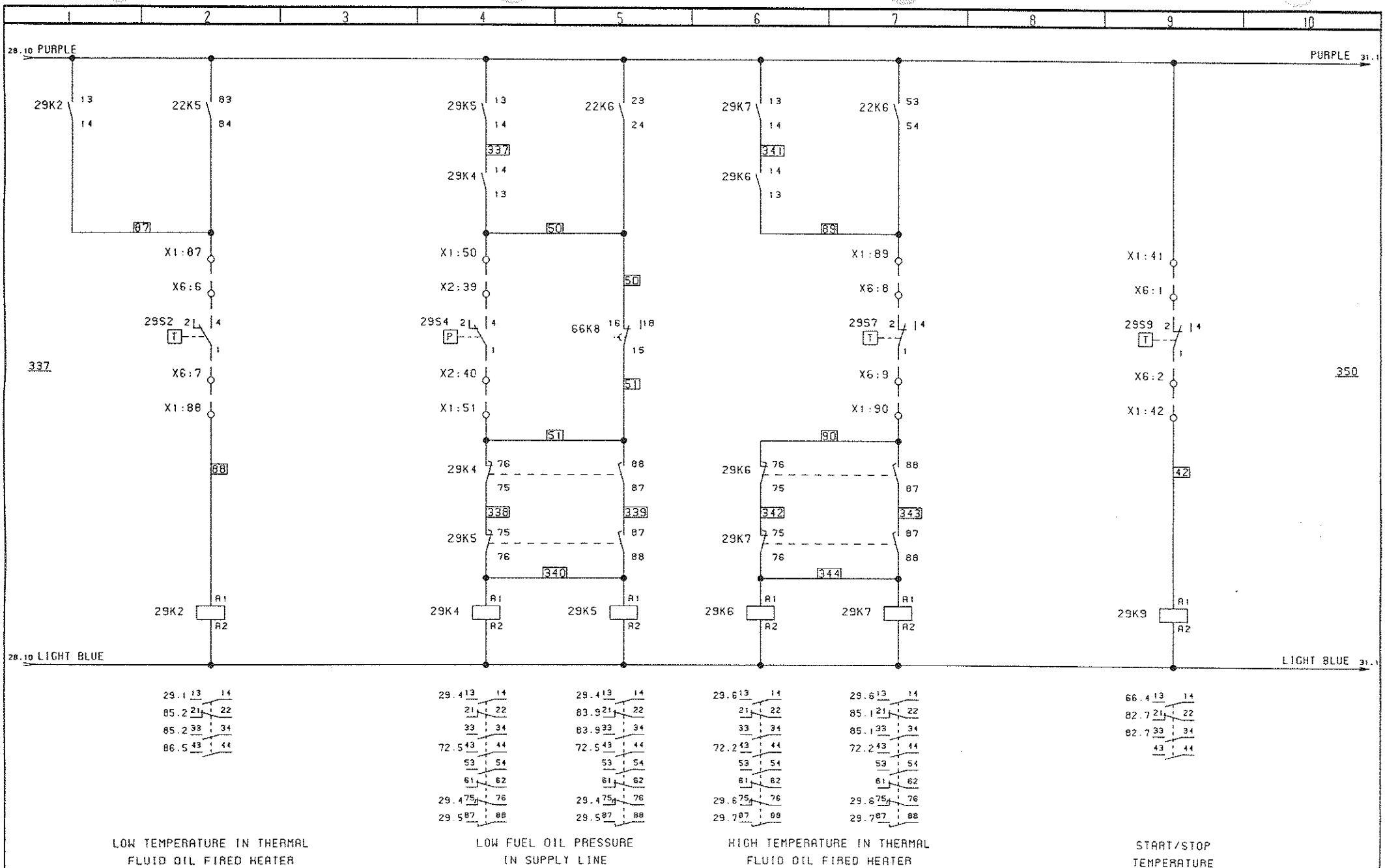
LIMIT SWITCH ON QUICK CLOSING FUEL OIL SUPPLY VALVE (CONTACTS CLOSED WHEN VALVES ARE FULLY OPENED)

TOO LOW FLOW THERMAL FLUID

LIMIT SWITCH ON BY PASS VALVE OPEN ON EXHAUST GAS HEATER

LIMIT SWITCH ON BY PASS VALVE OPEN ON OIL FIRED HEATER

ENGINEERING	(35113-59374-00609)	REV	DESCRIPTION	DATE	BY	SHEET	WIRING DIAGRAM	DRAWER	NC
FIRM	AALBORG INDUSTRIES	1							
DESIGNATION	* T1850 + T1851	2				REF	*	PROJECT	MPO
CUSTOMER	00-735214 + 735216	3				DRAWING NO	01279	PAGE	028
		4						DATE	18 05 2001



LOW TEMPERATURE IN THERMAL FLUID OIL FIRED HEATER

LOW FUEL OIL PRESSURE IN SUPPLY LINE

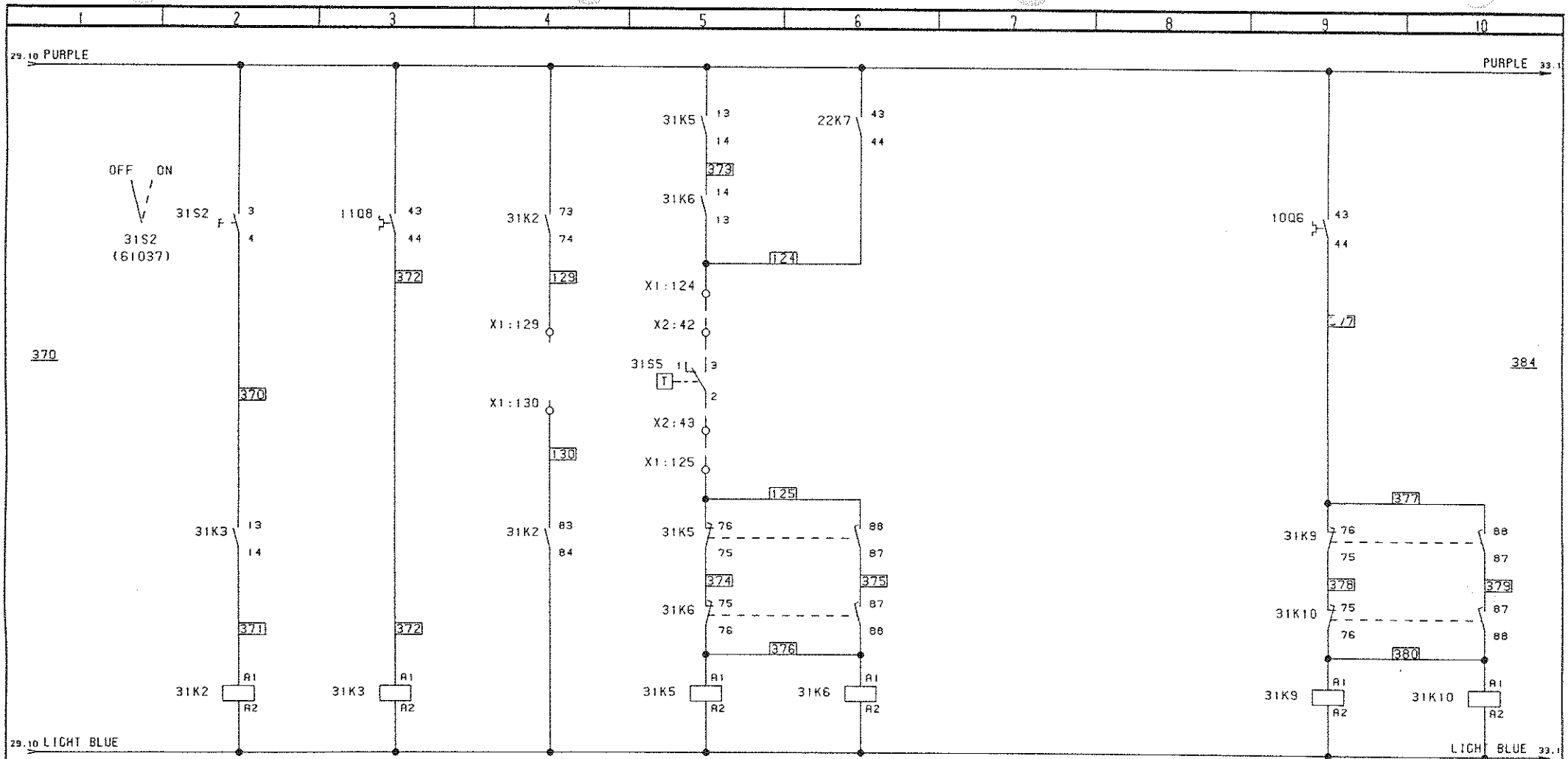
HIGH TEMPERATURE IN THERMAL FLUID OIL FIRED HEATER

START/STOP TEMPERATURE

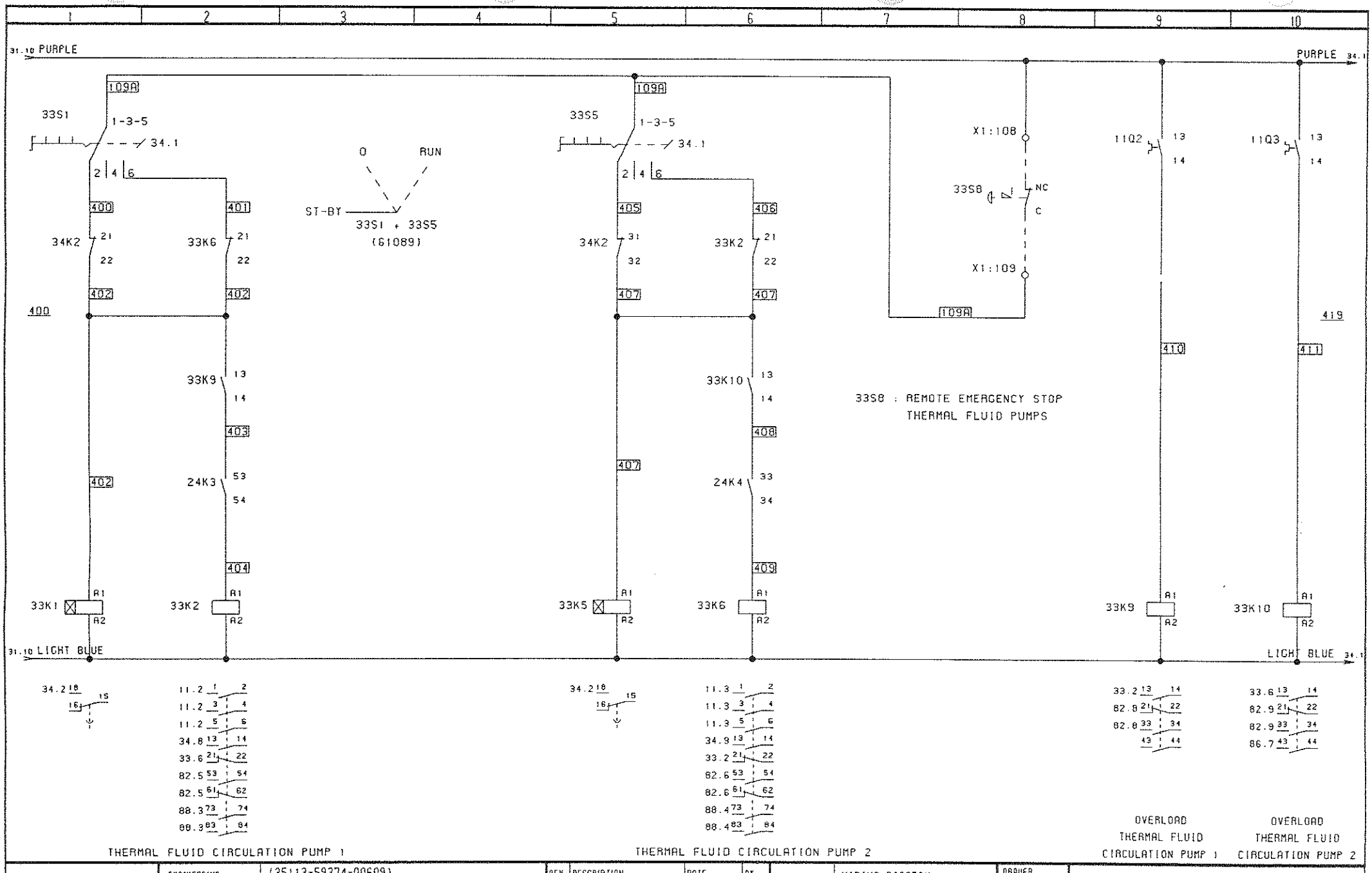
ENGINEERING	(35113-59374-00609)
FIRM	AALBORG INDUSTRIES
DESIGNATION	* T1850 + T1851
CUSTOMER	00-735214 + 735216

REV	DESCRIPTION	DATE	BY
1			
2			
3			
4			

SHEET	WIRING DIAGRAM		DRAWER NC
REF	*	PAGE	PROJECT MPO
DRAWING NO	01279	029	DATE 18.05.2001

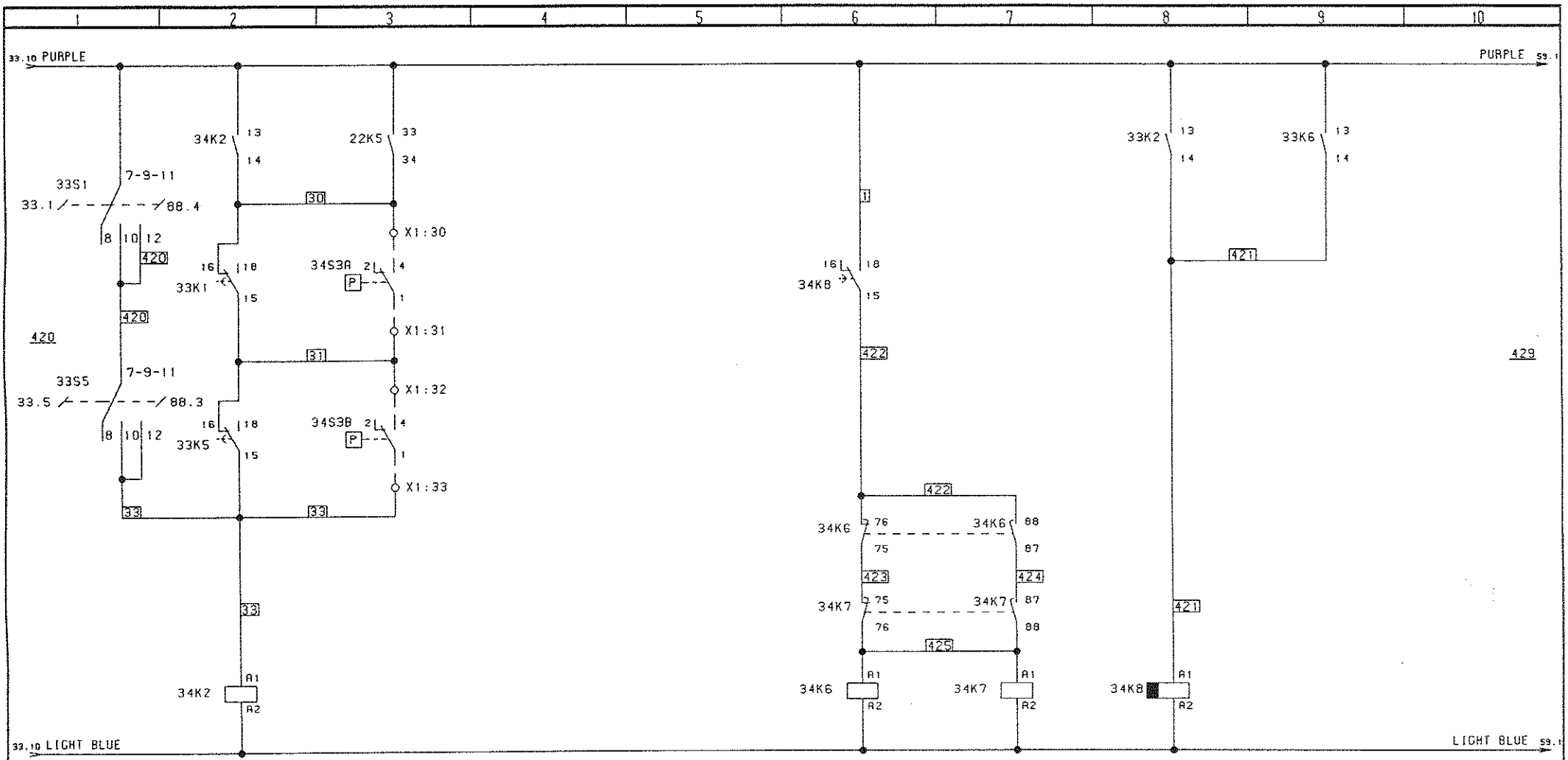


ENGINEERING	(35113-59374-00609)	REV	DESCRIPTION	DATE	BY	SHEET	WIRING DIAGRAM	DRAWER NC
FIRM	AALBORG INDUSTRIES	1				REF *	PAGE 031	PROJECT MPO
DESIGNATION	* T1850 + T1851	2				DRAWING NO 01279		DATE 18.05.2001
CUSTOMER	00-735214 + 735216	3						
		4						



		REV	DESCRIPTION	DATE	BY
ENGINEERING	(35113-59374-00609)	1			
FIRM	AALBORG INDUSTRIES	2			
DESIGNATION	* T1850 + T1851	3			
CUSTOMER	00-735214 + 735216	4			

SHEET	WIRING DIAGRAM		DRAWER NC
REF	*	PAGE 033	PROJECT MPO
DRAWING NO	01279		DATE 18.05.2001



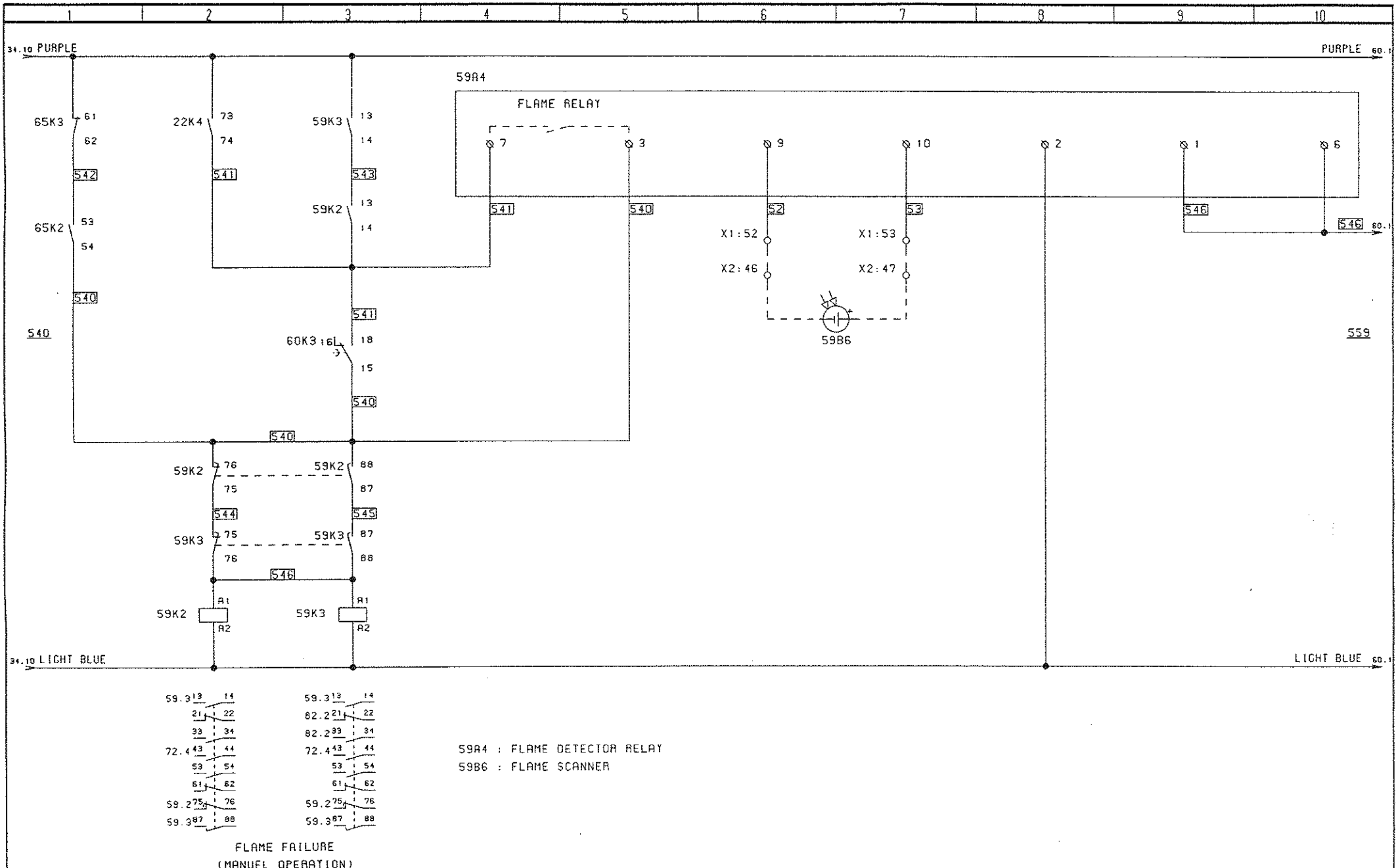
34S3A : PRESSURE SWITCH
THERMAL FLUID PUMP 1

34S3A : PRESSURE SWITCH
THERMAL FLUID PUMP 2

AUTO STAND-BY
THERMAL FLUID CIRCULATION PUMP

THERMAL FLUID CIRCULATION
PUMPS OFF

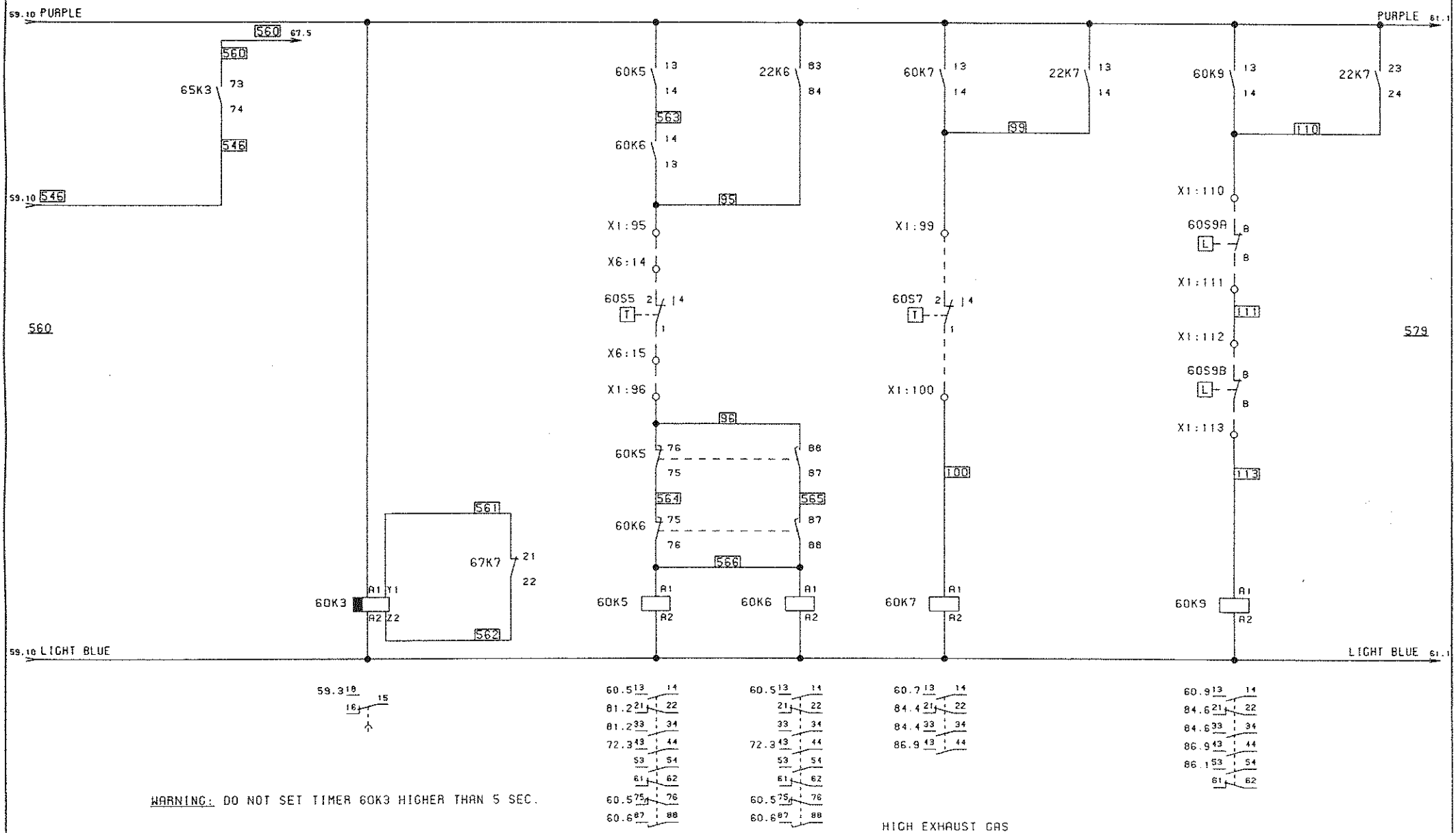
ENGINEERING	(35113-59374-00609)	REV	DESCRIPTION	DATE	BY	SHEET	WIRING DIAGRAM	DRAWER NC
FIRM	AALBORG INDUSTRIES	1				REF *	PAGE 034	PROJECT MPO
DESIGNATION	* T1850 + T1851	2						
		3						



59A4 : FLAME DETECTOR RELAY
59B6 : FLAME SCANNER

FLAME FAILURE
(MANUEL OPERATION)

ENGINEERING	(35113-59374-00609)	REV	DESCRIPTION	DATE	BY	SHEET	WIRING DIAGRAM	DRAWER	NC
FIRM	AALBORG INDUSTRIES	1							
DESIGNATION	* T1850 + T1851	2				REF	*	PROJECT	MPO
	00-735214 + 735216	3				DRAWING NO	01279	PAGE	059
								DATE	18.05.2001



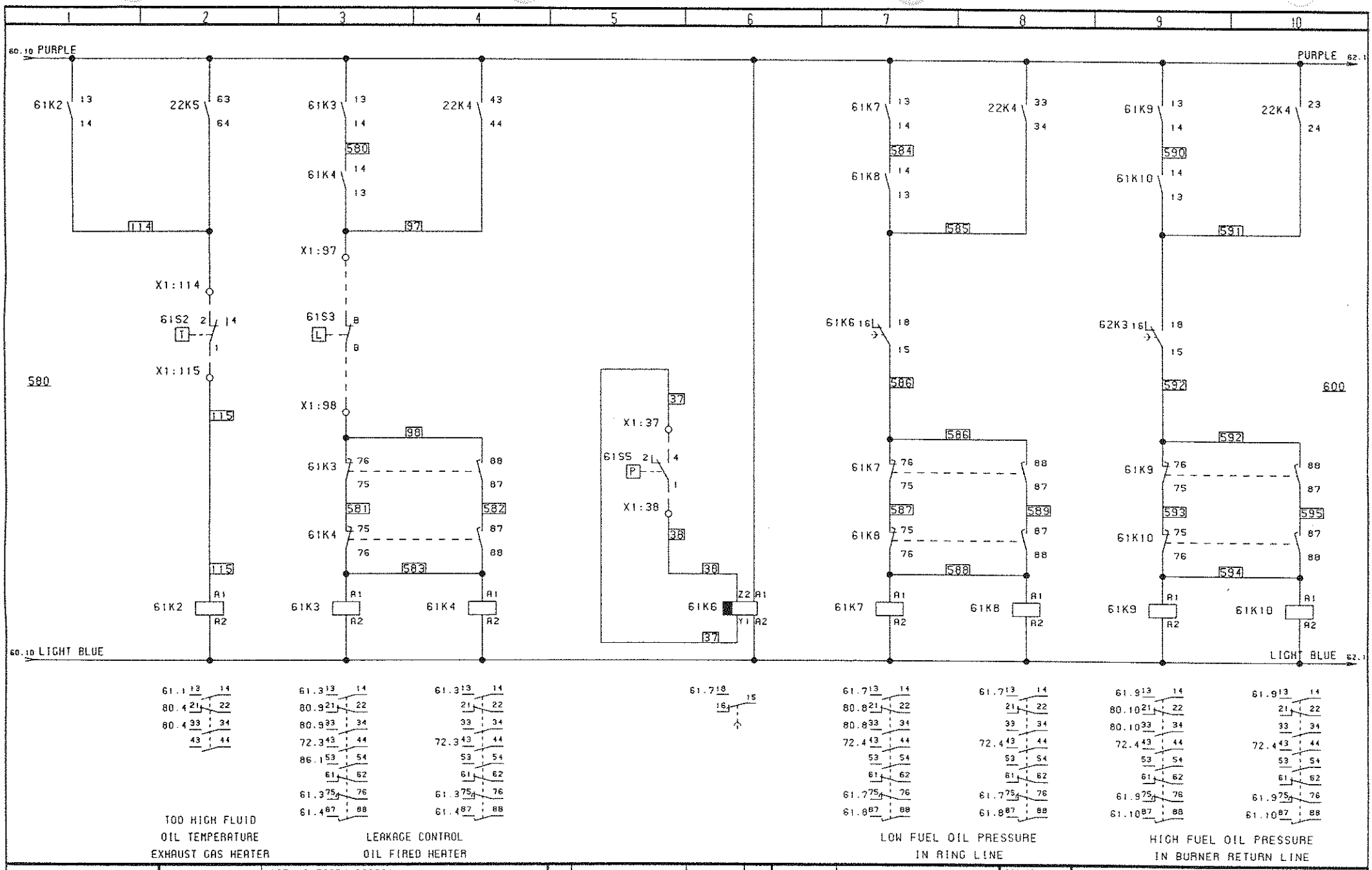
WARNING: DO NOT SET TIMER 60K3 HIGHER THAN 5 SEC.

HIGH EXHAUST GAS TEMPERATURE OIL FIRED HEATER

HIGH EXHAUST GAS TEMPERATURE EXHAUST GAS HEATER

LEAKAGE CONTROL LEVEL SWITCH EXHAUST GAS HEATER

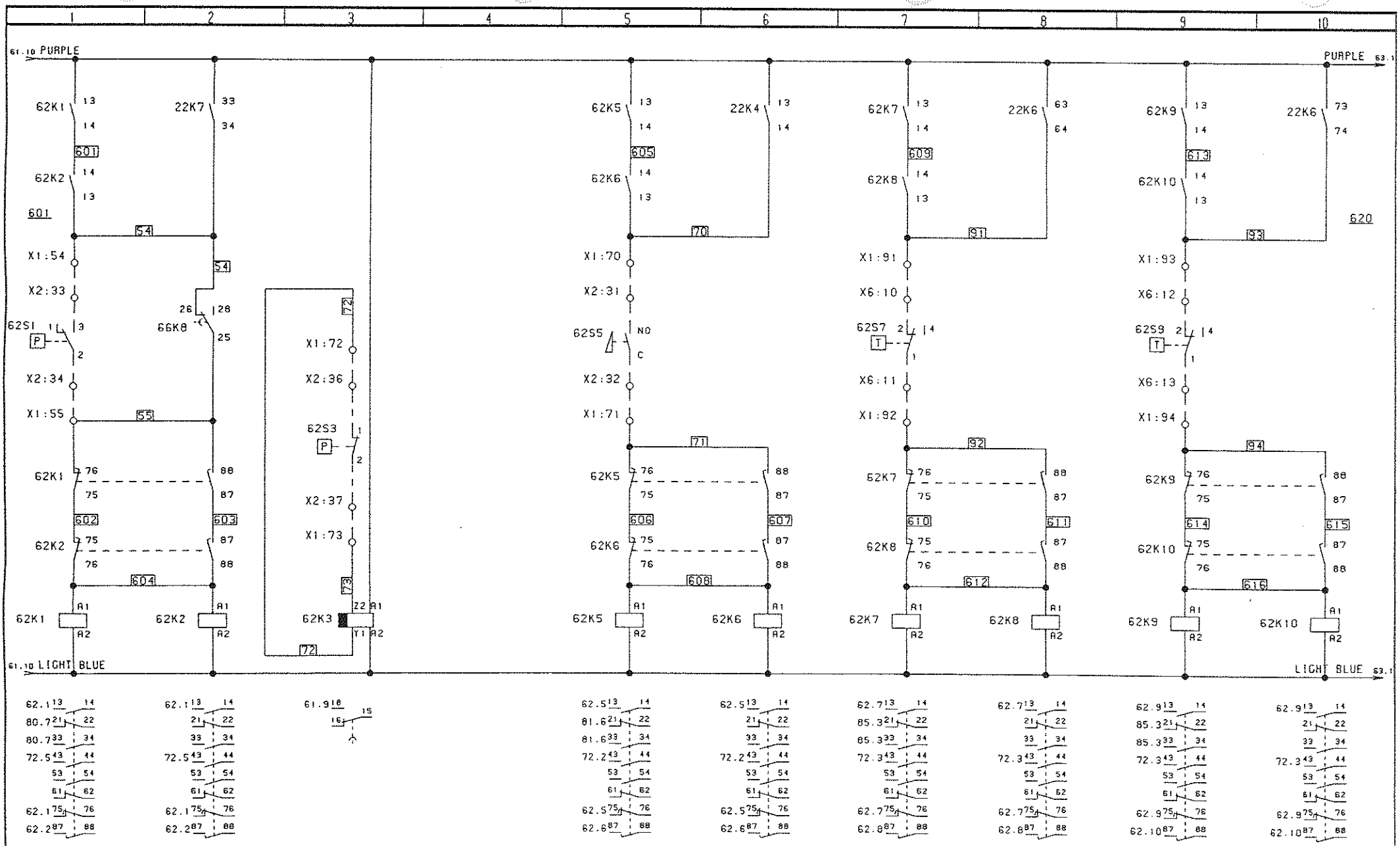
ENGINEERING	(35113-59374-00603)	REV	DESCRIPTION	DATE	BY	SHEET	WIRING DIAGRAM		DRAWER NC
FIRM	AALBORG INDUSTRIES	1				REF	*	PAGE	PROJECT MPO
DESIGNATION	* T1850 + T1851	2				DRAWING NO	01279	060	DATE 18.05.2001
CUSTOMER	00-735214 + 735216	3							



ENGINEERING	(35113-59374-00609)
FIRM	AALBORG INDUSTRIES
DESIGNATION	* T1850 + T1851
CUSTOMER	00-735214 + 735216

REV	DESCRIPTION	DATE	BY
1			
2			
3			
4			

SHEET	WIRING DIAGRAM		DRAWER NC
REF	*	PAGE	PROJECT MPO
DRAWING NO	01279	061	DATE 18.05.2001



ENGINEERING	(35113-59374-00609)	REV	DESCRIPTION	DATE	BY	SHEET	WIRING DIAGRAM	DRAWER	NC
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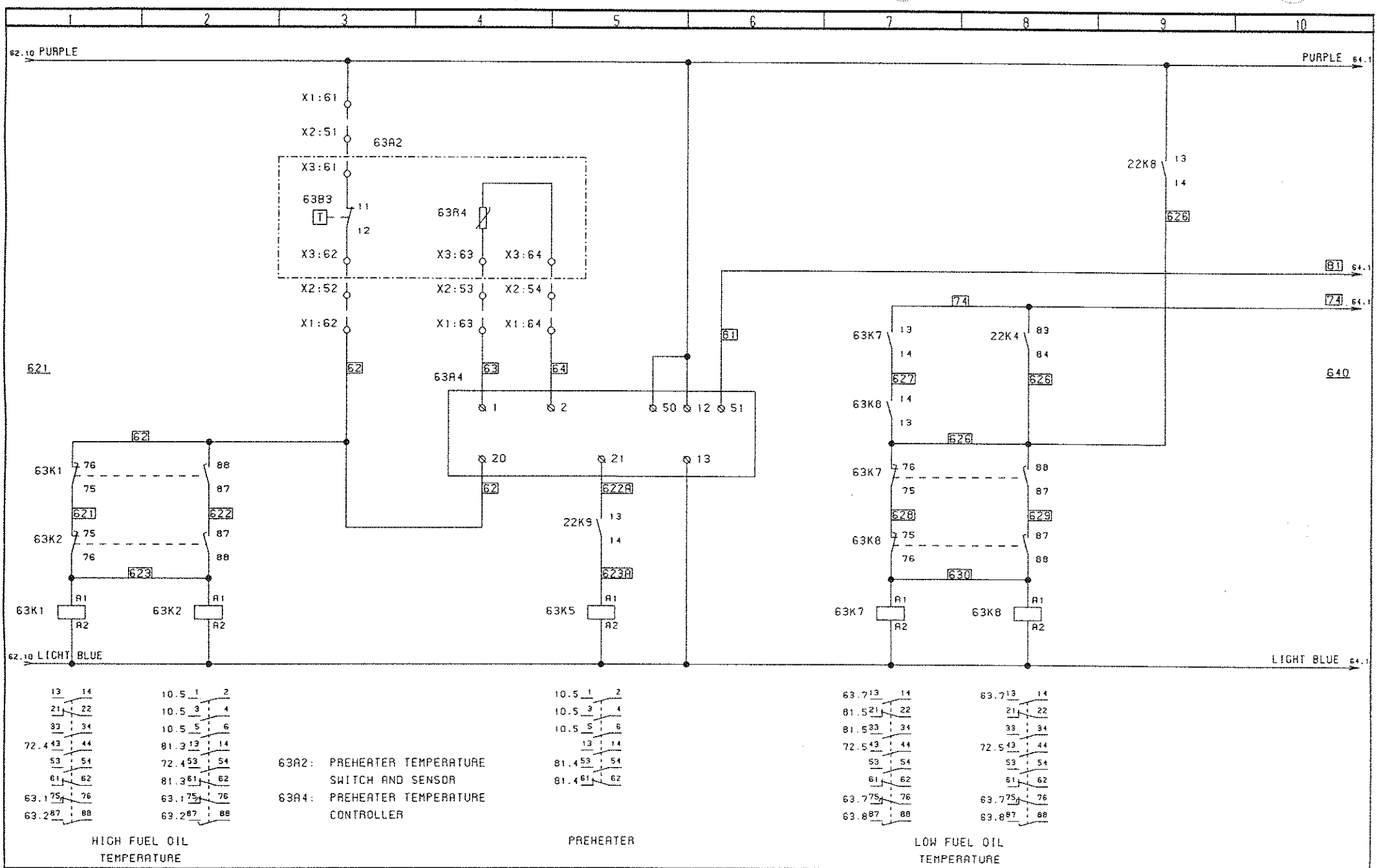
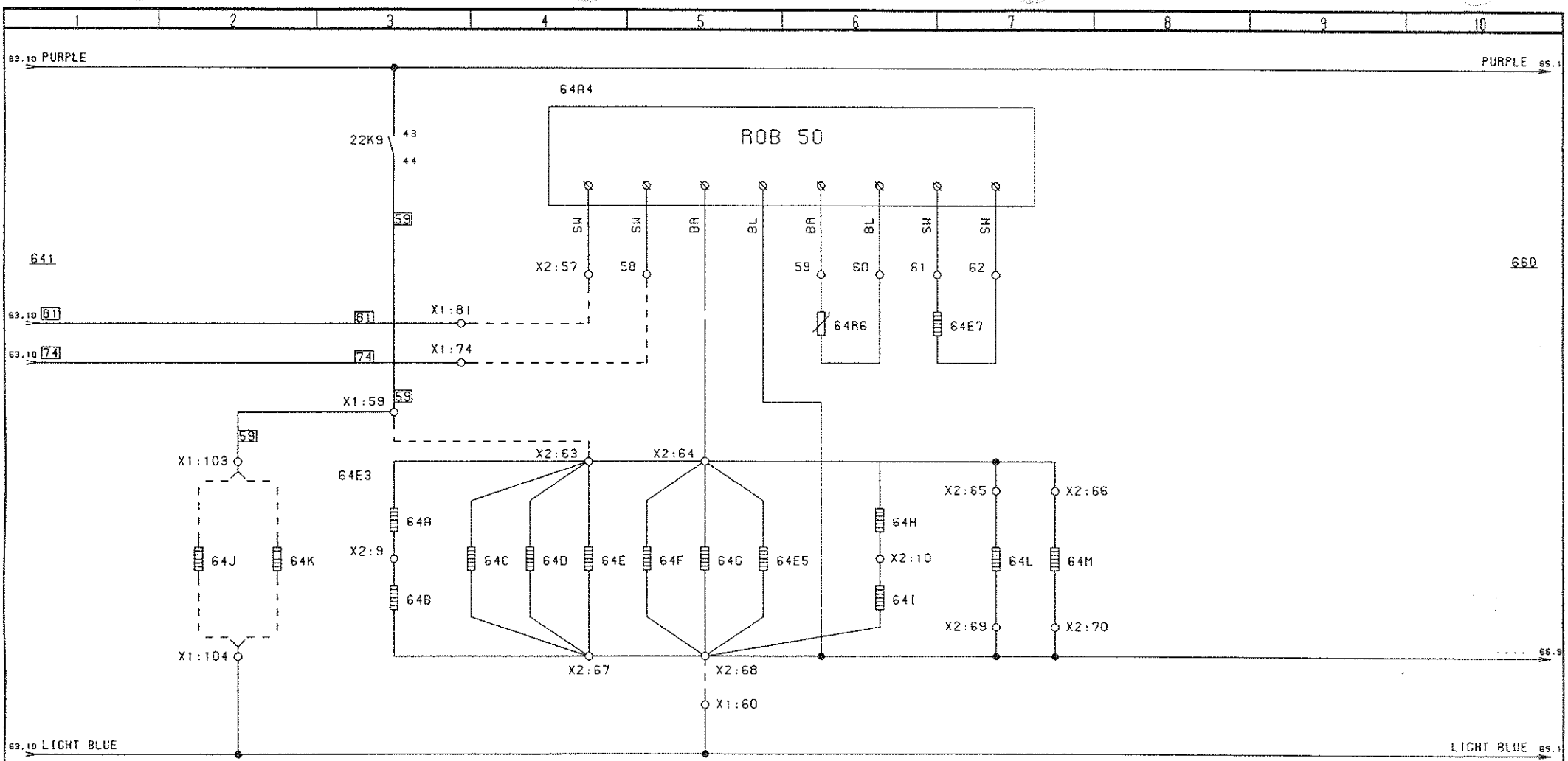
DESIGNATION	* T1850 + T1851	2				DRAWING NO	01279	062	PROJECT MPO
CUSTOMER	00-735214 + 735216	3							DATE 18 DE 2001



ENGINEERING	(35113-59374-00609)	REV	DESCRIPTION	DATE	BY	SHEET	WIRING DIAGRAM	DRAWER NC
FIRM	AALBORG INDUSTRIES	1				REF	*	PROJECT MPO
DESIGNATION	* T1850 + T1851	2				PAGE	063	
		3				DRAWING NO	01279	DATE

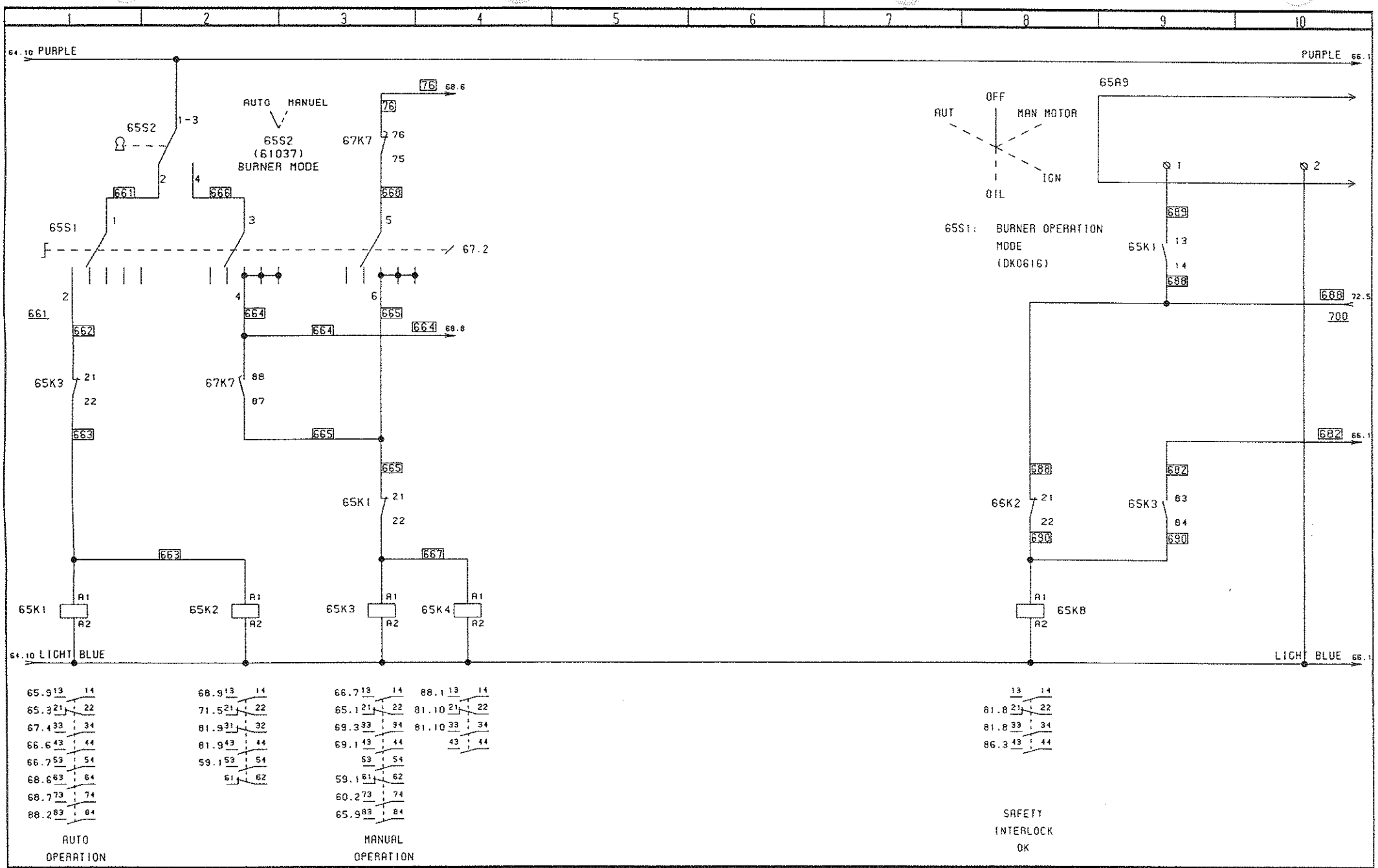


64E3:	HEATING ELEMENTS ON BURNER:		
64A :	HEATING FLEX OIL HOSES	62	WATT
64B :	HEATING FLEX OIL HOSES	80	WATT
64C :	PUMP	80	WATT
64D :	REGULATOR	20	WATT
64E :	OIL VALVE BLOCK	20	WATT
64F :	SAFETY VALVE 1	20	WATT
64G :	SAFETY VALVE 2	20	WATT
64E5:	HEATING ELEMENT IN FILTER	50	WATT
64E7:	HEATING NOZZLE HEAD	100	WATT

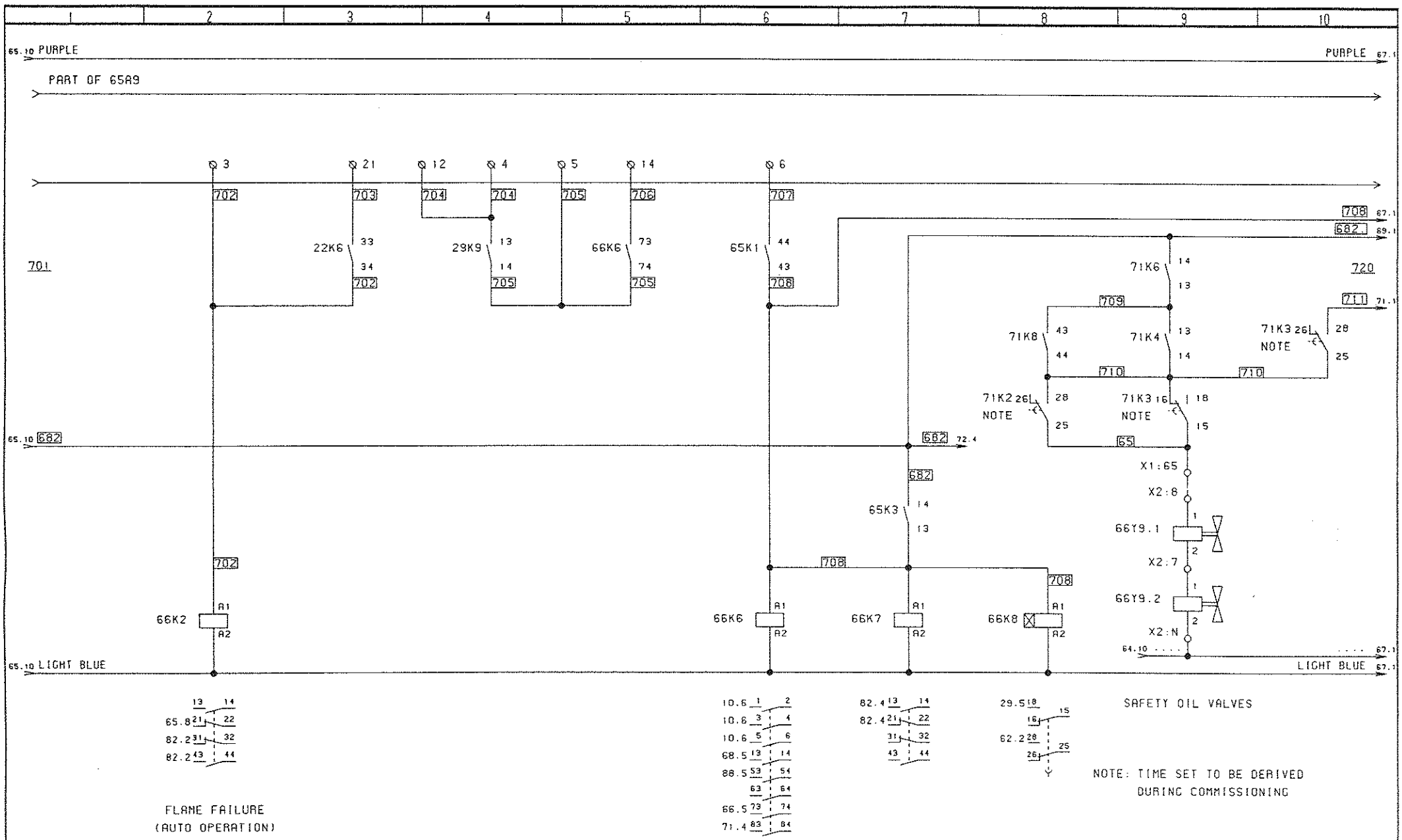
64A4:	TEMPERATURE REGULATOR NOZZLE HEAD
64R6:	TEMPERATURE SENSOR NOZZLE HEAD
64H :	HEATING CABLES ON INTERNAL PIPES
64I :	HEATING CABLES ON INTERNAL PIPES
64J :	HEATING ON STRAINERS AT FUEL OIL TRANSFER PUMPS 165 WATT
64K :	HEATING ON STRAINERS AT FUEL OIL TRANSFER PUMPS 165 WATT
64L :	PRESSURE SWITCH RETURN LINE
64M :	PRESSURE SWITCH SUPPLY LINE

		REV	DESCRIPTION	DATE	BY
ENGINEERING	(35113-59374-00609)	1			
FIRM	AALBORG INDUSTRIES	2			
DESIGNATION	* T1850 + T1851	3			
CUSTOMER	00-735214 + 735216	4			

SHEET	WIRING DIAGRAM		DRAWER NC
REF	*	PAGE	PROJECT MPO
DRAWING NO	01279	064	DATE 18.05.2001



ENGINEERING	(35113-59374-00609)	REV	DESCRIPTION	DATE	BY	SHEET	WIRING DIAGRAM		DRAWER NC
FIRM	AALBORG INDUSTRIES	1				REF	*	PAGE	PROJECT MPO
DESIGNATION	* T1850 + T1851	2				DRAWING NO	01279	065	DATE 18.05.2001
CUSTOMER	00-735214 + 735216	3							
		4							



ENGINEERING	(35113-59374-00609)	REV	DESCRIPTION	DATE	BY	SHEET	WIRING DIAGRAM		DRAWER NC
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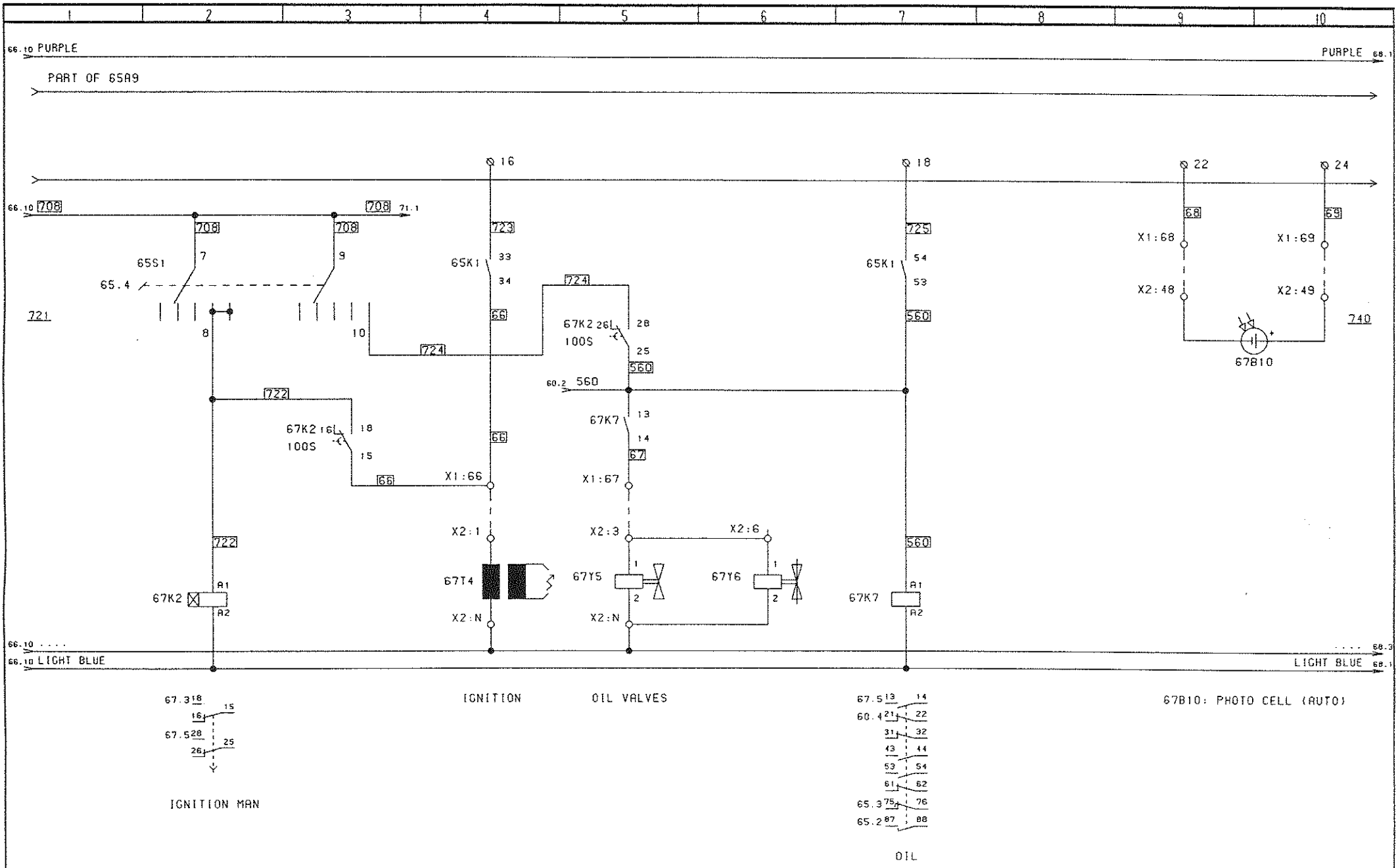
DESIGNATION	* T1850 + T1851	2					01279	066	DATE
		3							



ENGINEERING	(35113-59374-00609)	REV	DESCRIPTION	DATE	BY	SHEET	WIRING DIAGRAM		DRAWER NC
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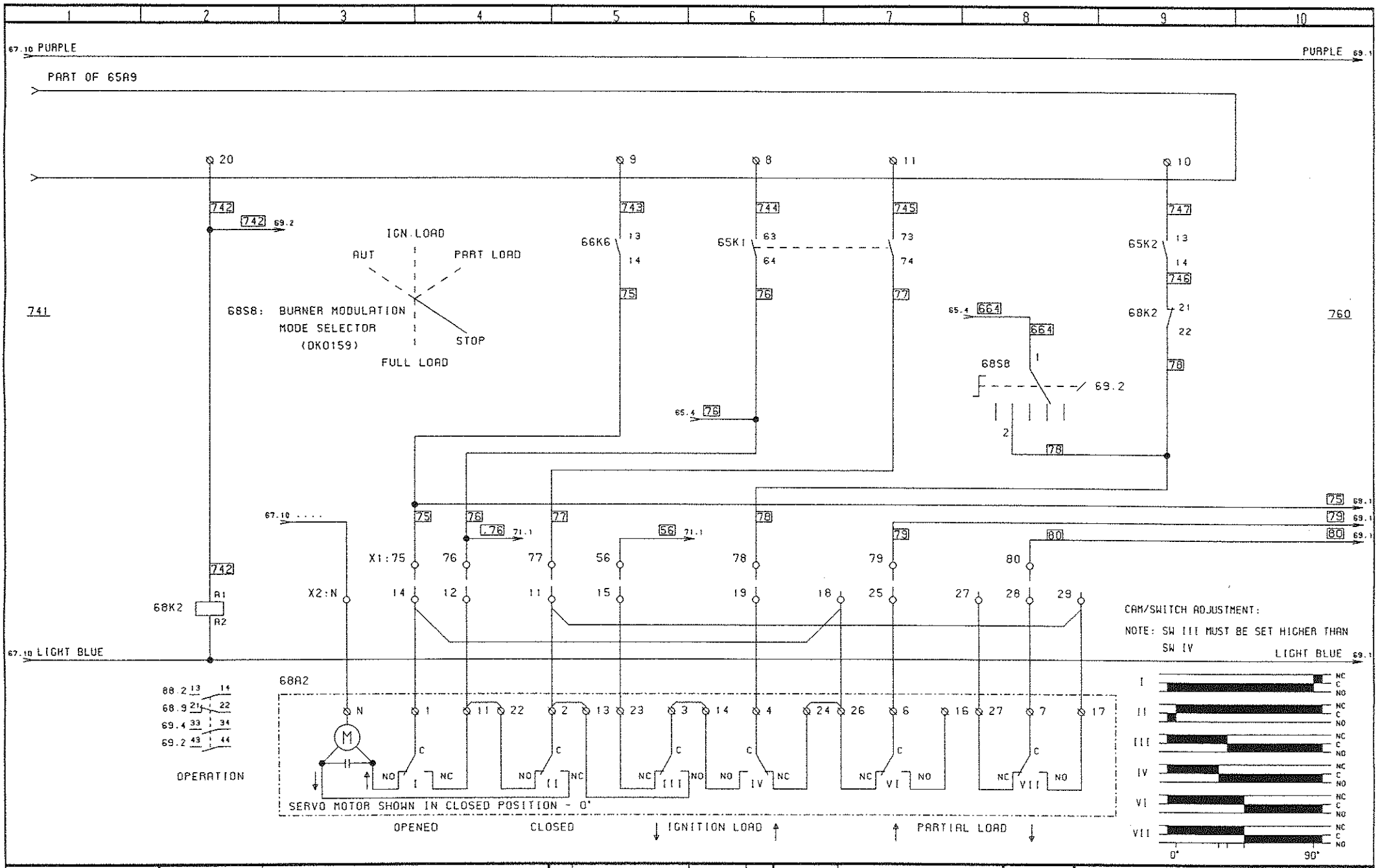
DESIGNATION	* T1850 + T1851	2				DRAWING NO	01279	067	DATE 18 DS 2001
CUSTOMER	00-735214 + 735216	3							



ENGINEERING	(35113-59374-00609)	REV	DESCRIPTION	DATE	BY	SHEET	WIRING DIAGRAM	DRAWER	NC
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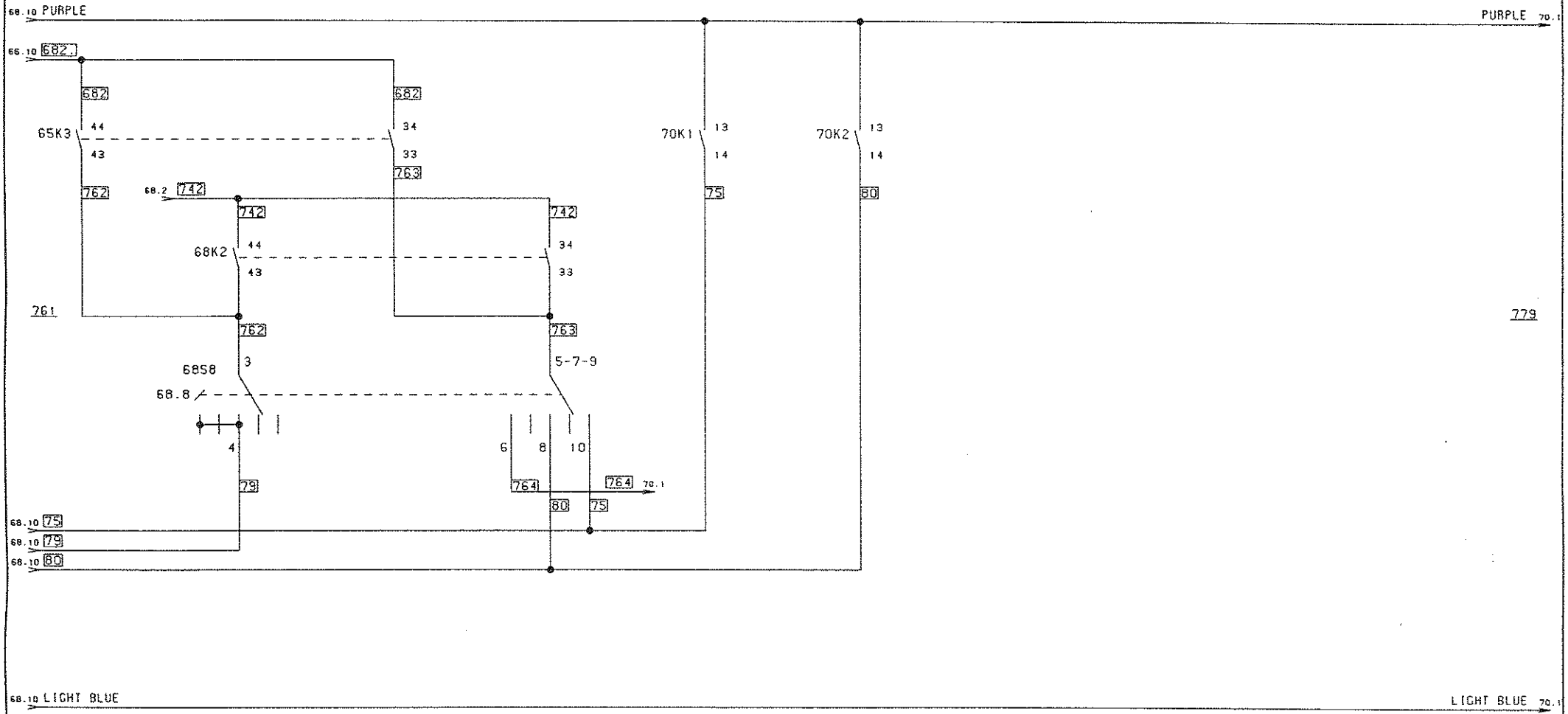
DESIGNATION	* T1850 + T1851	2				PAGE	068	DATE	
		3							



ENGINEERING	(35113-59374-00609)	REV	DESCRIPTION	DATE	BY	SHEET	WIRING DIAGRAM		DRAWER NC
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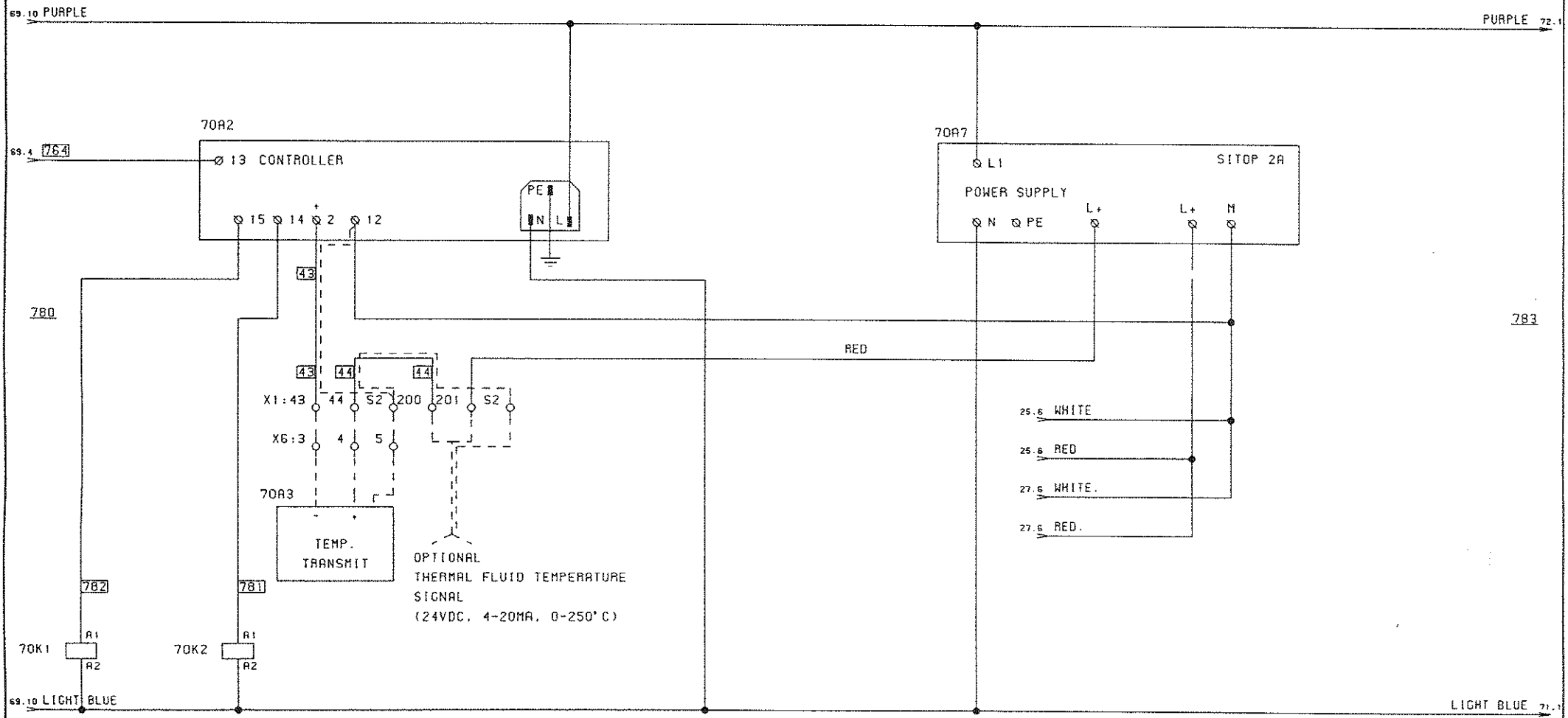
DESIGNATION	* T1850 + T1851	2				DRAWING NO	01279		DATE OF ISSUE
	00-735214 + 735216	3							



70A2: BURNER LOAD CONTROLLER
70A3: THERMAL FLUID TEMPERATURE TRANSMITTER
BURNER MODULATION
70A7: POWER SUPPLY

ENGINEERING	(35113-59374-00609)
FIRM	AALBORG INDUSTRIES
DESIGNATION	* T1850 ; T1851

REV	DESCRIPTION	DATE	BY
1			
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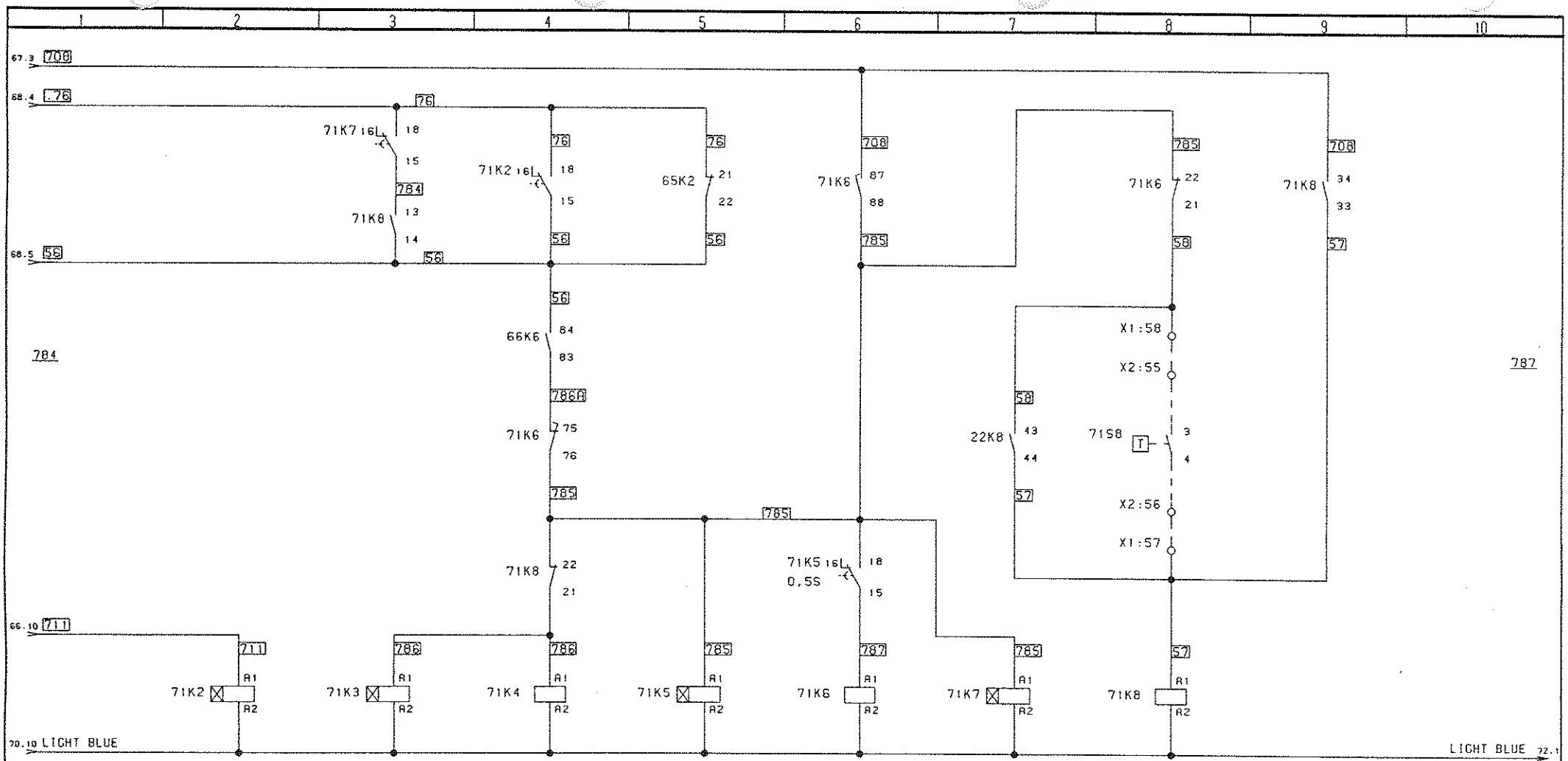
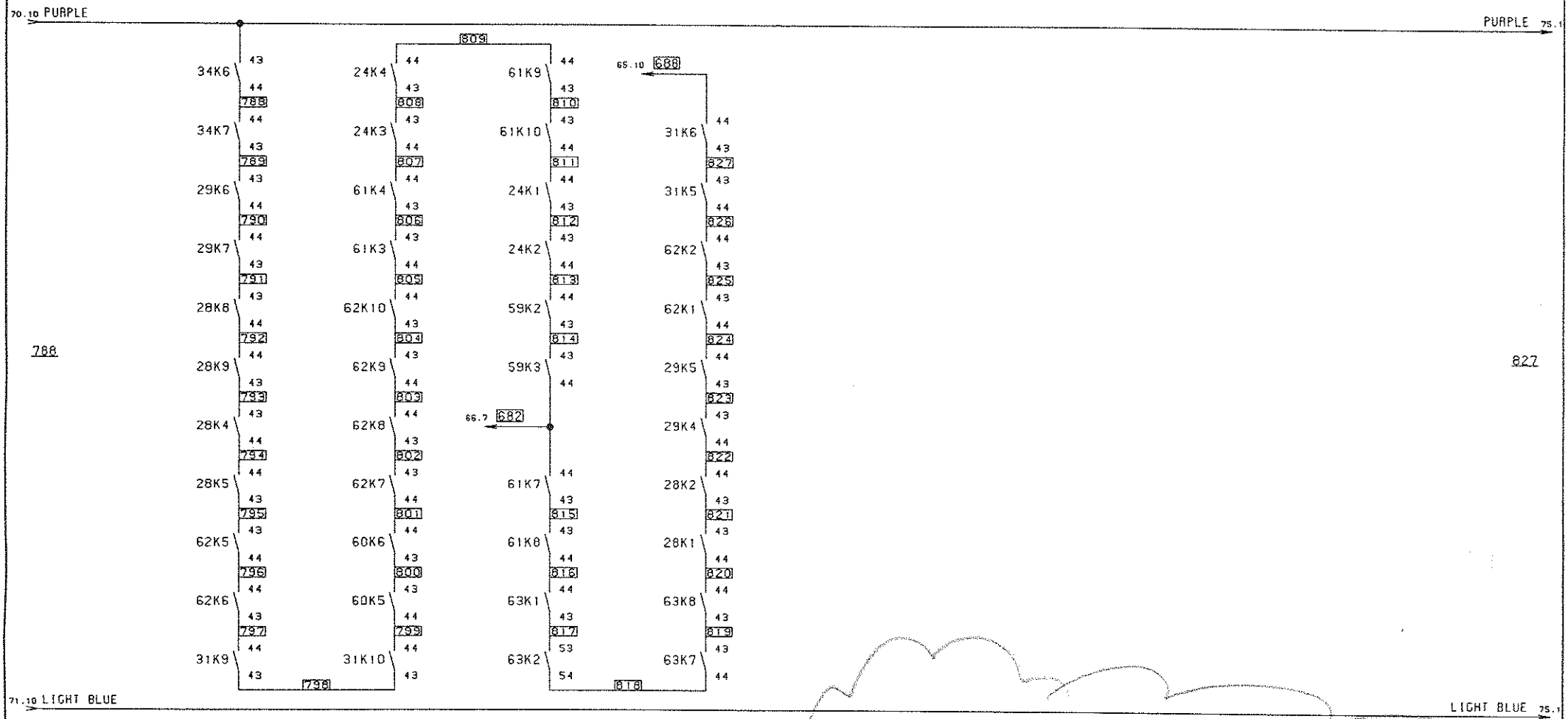
SHEET	WIRING DIAGRAM		DRAWER NC
REF	*	PAGE 070	PROJECT MPO
	01279		DATE



ENGINEERING	(35113-59374-00609)	REV	DESCRIPTION	DATE	BY	SHEET	WIRING DIAGRAM		DRAWER	NC
FIRM	AALBORG INDUSTRIES	1				REF	*	PAGE	PROJECT	MPO
DESIGNATION	* T1850 + T1851	2				DRAWING NO	01279	071	DATE	18.05.2001
CUSTOMER	00-735214 + 735216	3								
		4								



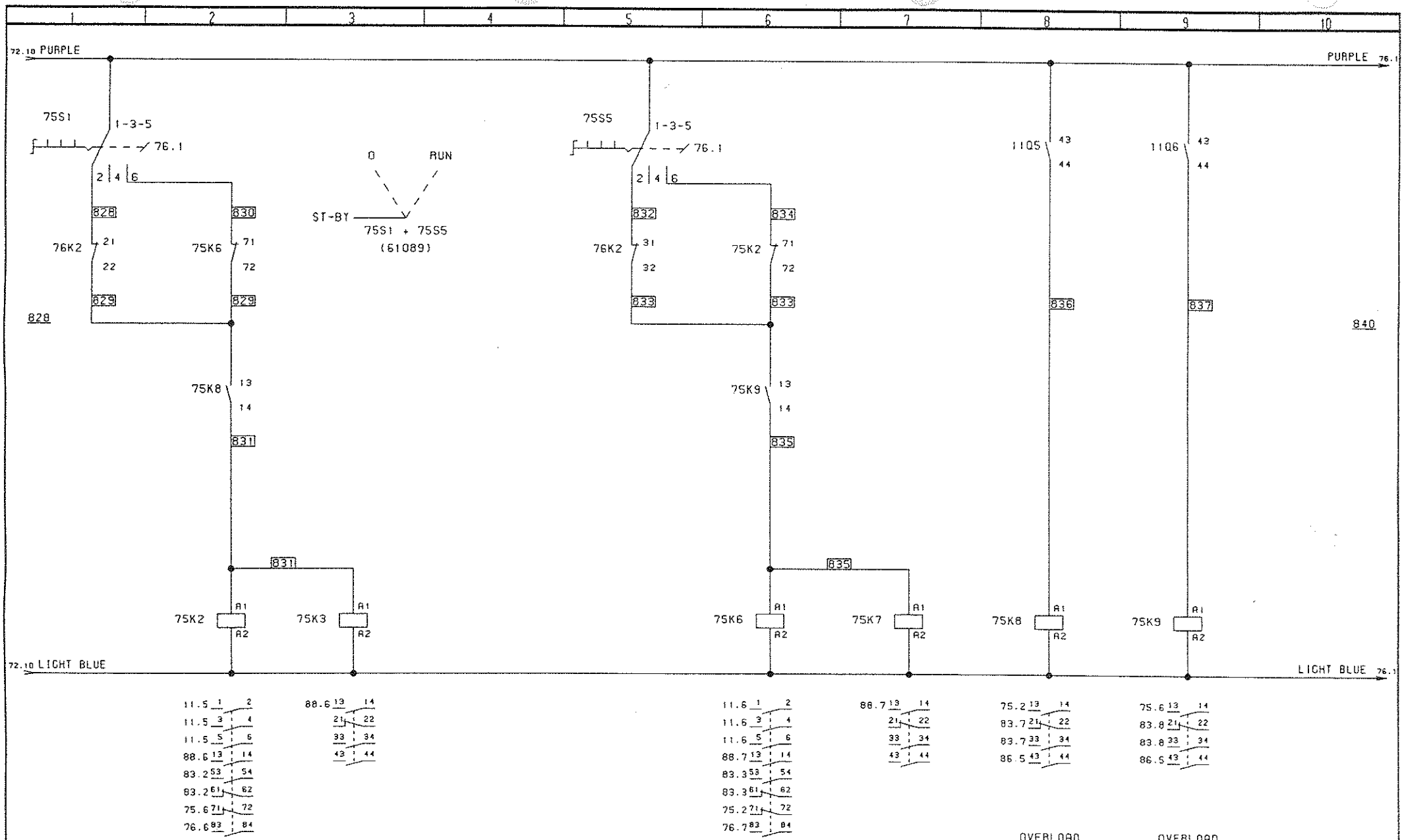
SAFETY INTERLOCKS: AUTOMATIC OPERATION

1: THERMAL FLUID CIRCULATION PUMPS OFF
2: HIGH TEMPERATURE IN THERMAL FLUID OIL FIRED HEATER
3: BYPASS VALVE OPEN ON OIL FIRED HEATER
4: LOW FLOW THERMAL FLUID
5: BURNER SWING OUT
6: BURNER MOTOR OVERLOAD
7: HIGH EXHAUST GAS TEMPERATURE OIL FIRED HEATER
8: HIGH TEMPERATURE IN COIL 1 OIL FIRED HEATER
9: HIGH TEMPERATURE IN COIL 2 OIL FIRED HEATER
10: LEAKAGE CONTROL OIL FIRED HEATER
11: QUICK CLOSING VALVE EXPANSION TANK ACTIVATED
12: HIGH FUEL OIL PRESSURE IN BURNER RETURN LINE
13: TOO LOW LEVEL EXPANSION TANK
14: FLAME FAILURE
15: LOW FUEL OIL PRESSURE IN RING LINE
16: HIGH FUEL OIL TEMPERATURE
17: LOW FUEL OIL TEMPERATURE
18: FUEL OIL QUICK CLOSING VALVE CLOSED
19: LOW FUEL OIL PRESSURE IN SUPPLY LINE
20: LOW COMBUSTION AIR PRESSURE
21: LOW FUEL OIL TEMPERATURE IN SUPPLY LINE

SAFETY INTERLOCKS: MANUAL OPERATION

1: THERMAL FLUID CIRCULATION PUMPS ON
2: HIGH TEMP.IN THERMAL FLUID OIL FIRED HEATER
3: BYPASS VALVE OPEN ON OIL FIRED HEATER
4: LOW FLOW THERMAL FLUID
5: BURNER SWING OUT
6: BURNER MOTOR OVERLOAD
7: HIGH EXHAUST GAS TEMP. OIL FIRED HEATER
8: HIGH TEMPERATURE IN COIL 1 OIL FIRED HEATER
9: HIGH TEMPERATURE IN COIL 2 OIL FIRED HEATER
10: LEAKAGE CONTROL OIL FIRED HEATER
11: QUICK CLOSING VALVE EXPANSION TANK ACTIVATED
12: HIGH FUEL OIL PRESSURE IN BURNER RETURN LINE
13: TOO LOW LEVEL EXPANSION TANK
14: FLAME FAILURE

ENGINEERING	(35113-59374-00609)	REV	DESCRIPTION	DATE	BY	SHEET: WIRING DIAGRAM; DRAWER: NC
FIRM	AALBORG INDUSTRIES	1				
DESIGNATION	* T1850 + T1851	2				REF: * PAGE: 072; PROJECT: MPO
CUSTOMER	00-735214 + 735216	3				DRAWING NO: 01279; DATE: 18.05.2001
		4				



ENGINEERING	(35113-59374-00609)
FIRM	AALBORG INDUSTRIES
DESIGNATION	* T1850 + T1851
CUSTOMER	00-735214 + 735216

REV	DESCRIPTION	DATE	BY
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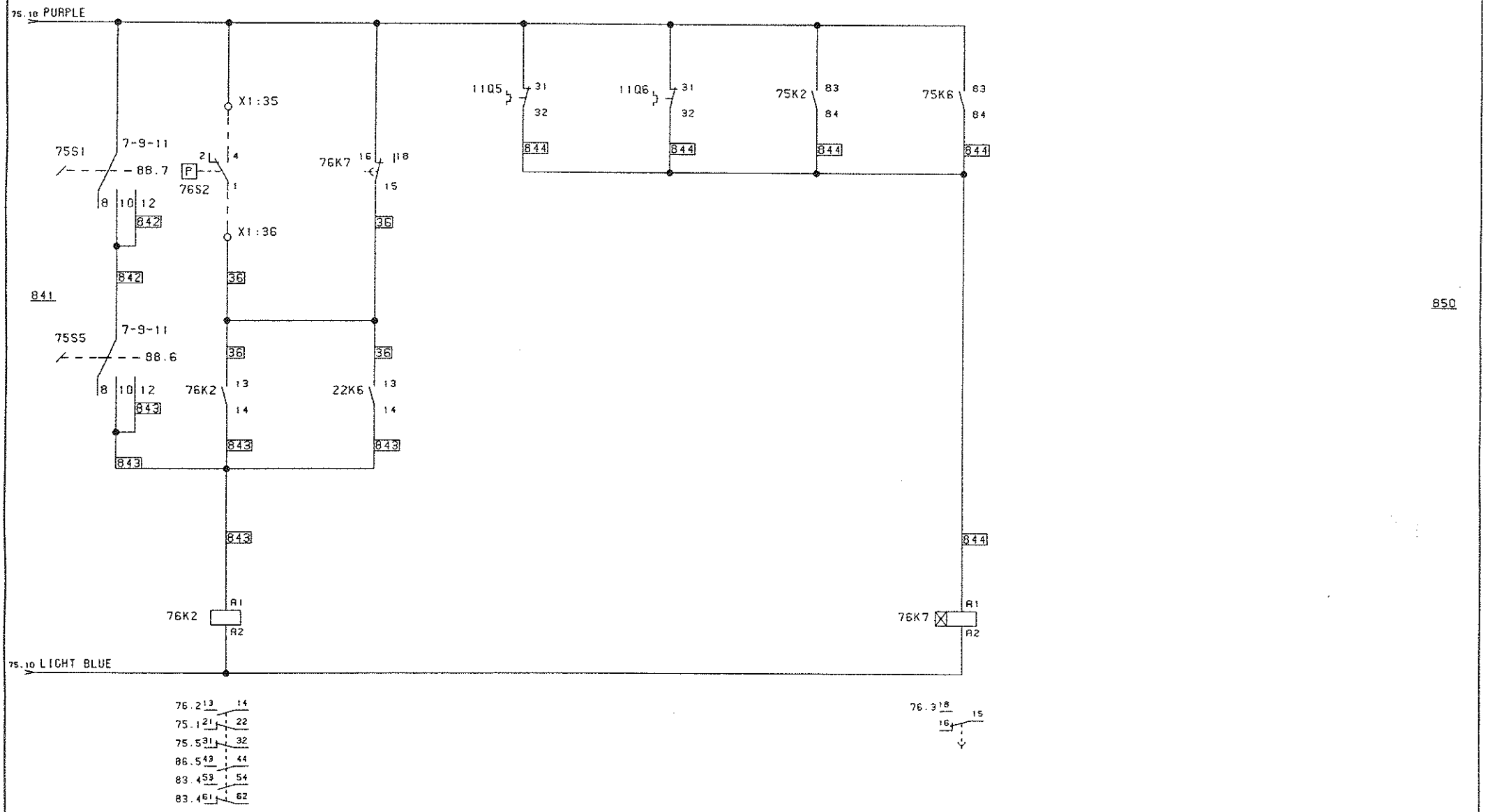
SHEET	WIRING DIAGRAM		
REF	*	PAGE	
DRAWING NO	01279	075	

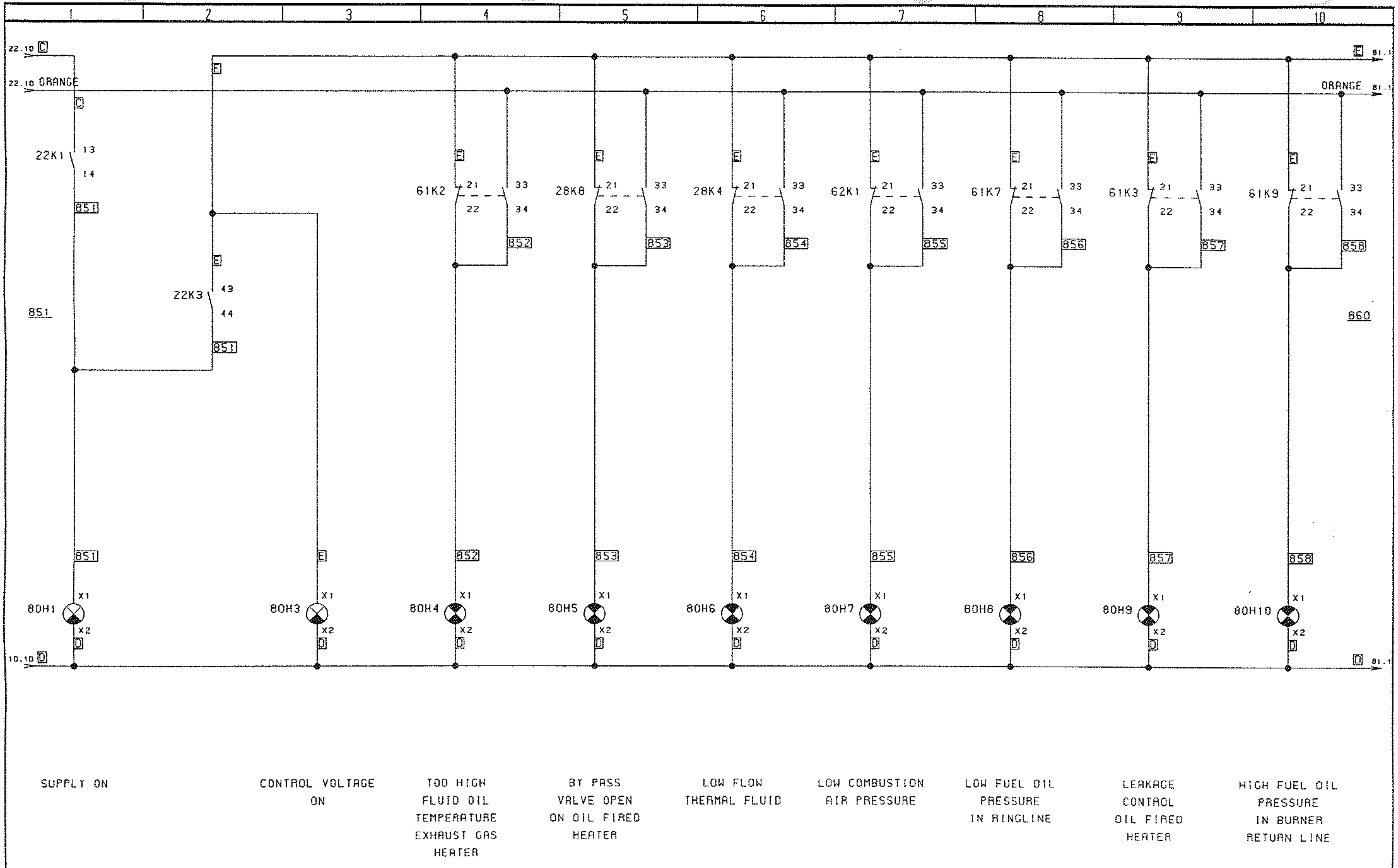
DRAWER	NC
PROJECT	MPO
DATE	18.05.2001



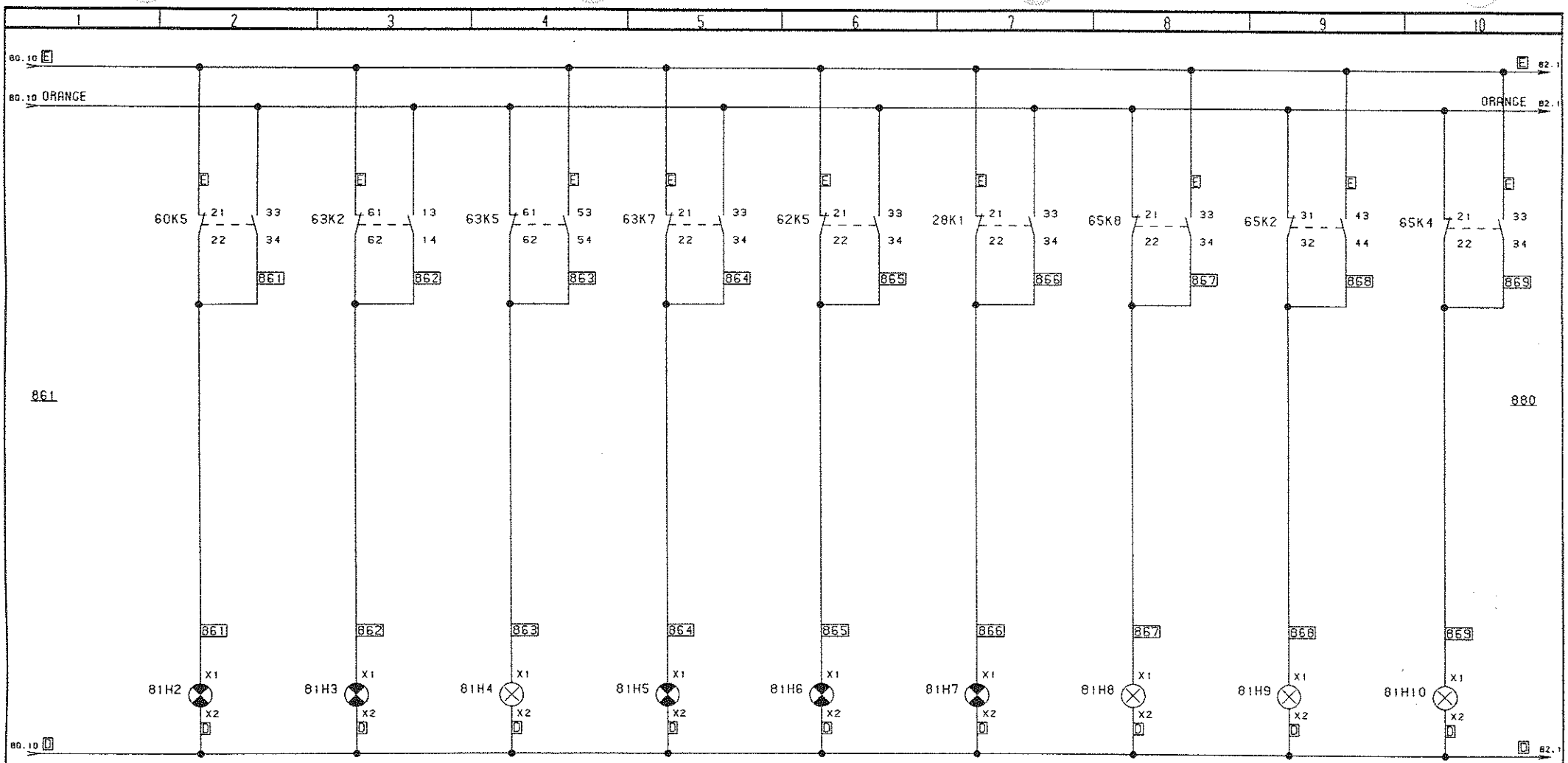
AUTO STAND-BY

FUEL OIL TRANSFER PUMP START

		REV	DESCRIPTION	DATE	BY				
ENGINEERING	(35113-59374-00609)	1				SHEET	WIRING DIAGRAM	DRAWER	NC
FIRM	AALBORG INDUSTRIES	2				REF	*	PAGE	PROJECT MPO
DESIGNATION	* T1850 + T1851	3				DRAWING NO	01279	076	DATE 18.05.2001
CUSTOMER	00-735214 + 735216	4							



		REV	DESCRIPTION	DATE	BY				
ENGINEERING	(35113-59374-00609)					SHEET	WIRING DIAGRAM		DRAWER NC
FIRM	AALBORG INDUSTRIES	1				REF	*	PAGE	PROJECT MPO
DESIGNATION	* T1850 + T1851	2				DRAWING NO	01279	080	DATE 18.05.2001
CUSTOMER	00-735214 + 735216	3							
		4							



ENGINEERING	(35113-59374-00609)
FIRM	AALBORG INDUSTRIES
DESIGNATION	* T1850 + T1851
CUSTOMER	00-735214 + 735216

REV	DESCRIPTION	DATE	BY
1			
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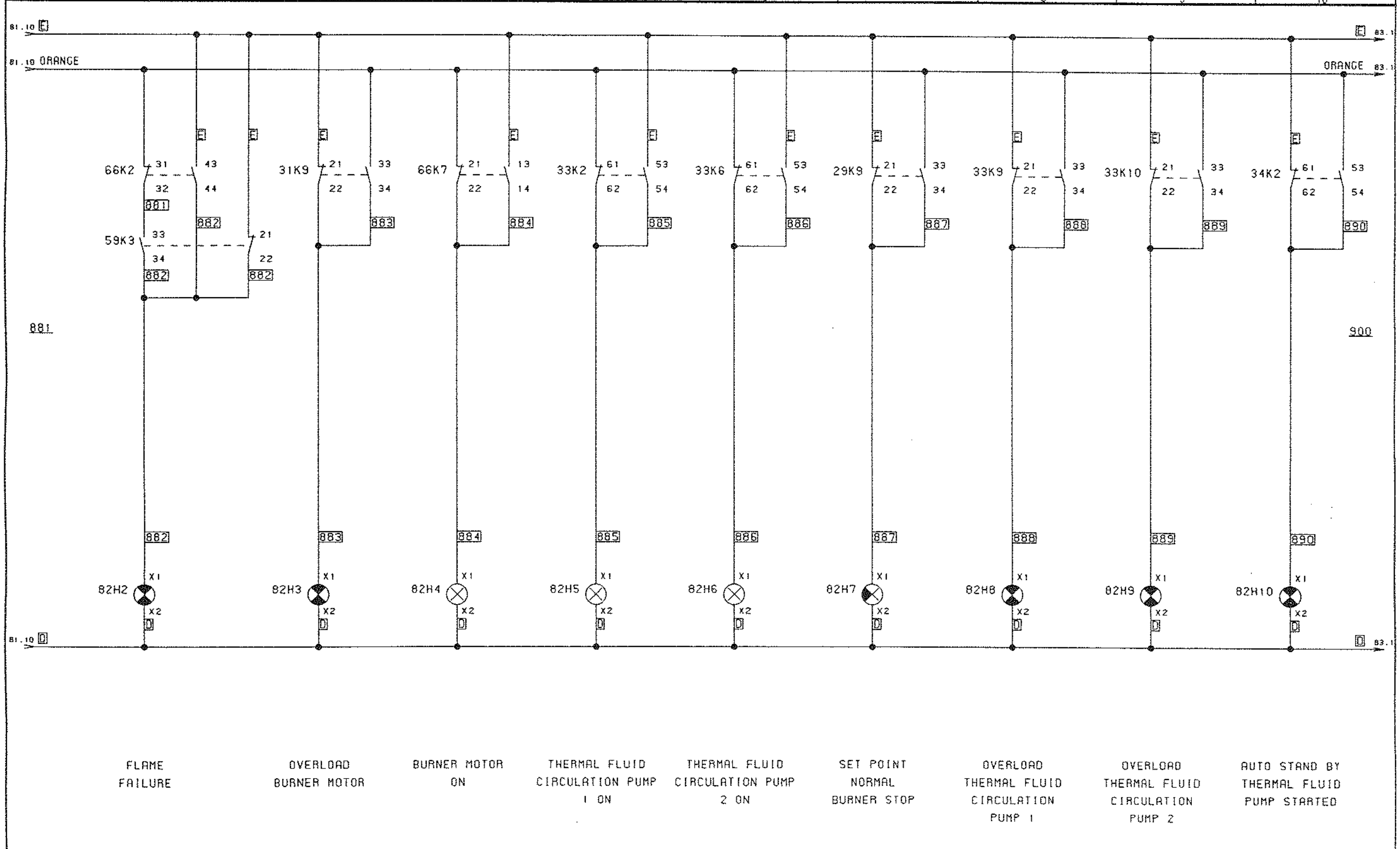
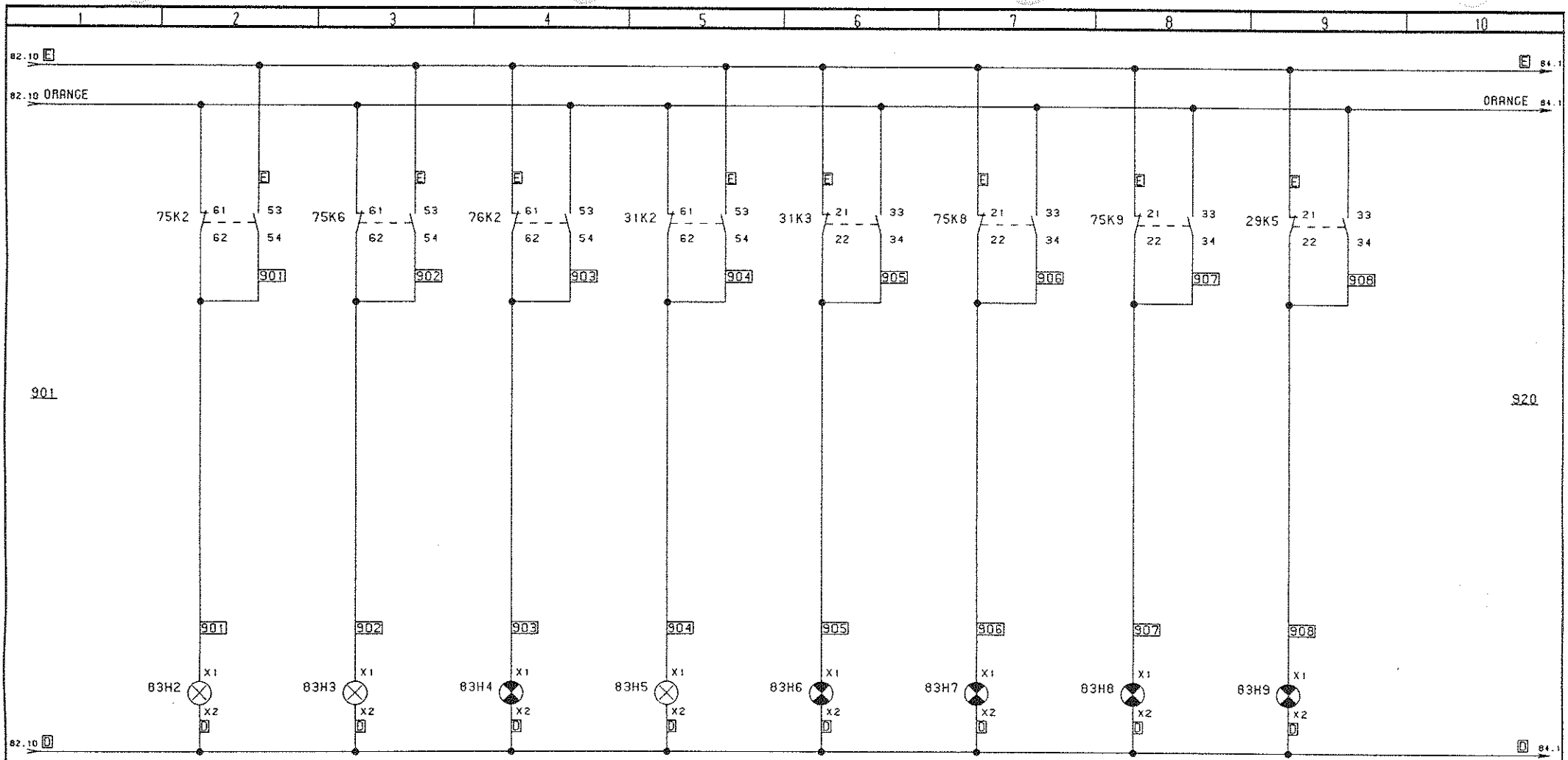
SHEET	WIRING DIAGRAM		DRAWER NC
REF	*	PAGE	PROJECT MPO
DRAWING NO	01279	081	DATE 18.05.2001



ENGINEERING	(35113-59374-00609)	REV	DESCRIPTION	DATE	BT	SHEET	WIRING DIAGRAM
FIRM	AALBORG INDUSTRIES	1				REF	*
DESIGNATION	* T1850 + T1851	2				PAGE	082
CUSTOMER	00-735214 + 735216	3				DRAWING NO	01279
		4					

DRAWER NC
PROJECT MPO
DATE 18.05.2001



FUEL OIL TRANSFER PUMP 1 ON

FUEL OIL TRANSFER PUMP 2 ON

AUTO STAND BY FUEL OIL TRANSFER PUMP STARTED

FILLING PUMP ON

OVERLOAD FILLING PUMP

OVERLOAD FUEL OIL TRANSFER PUMP 1

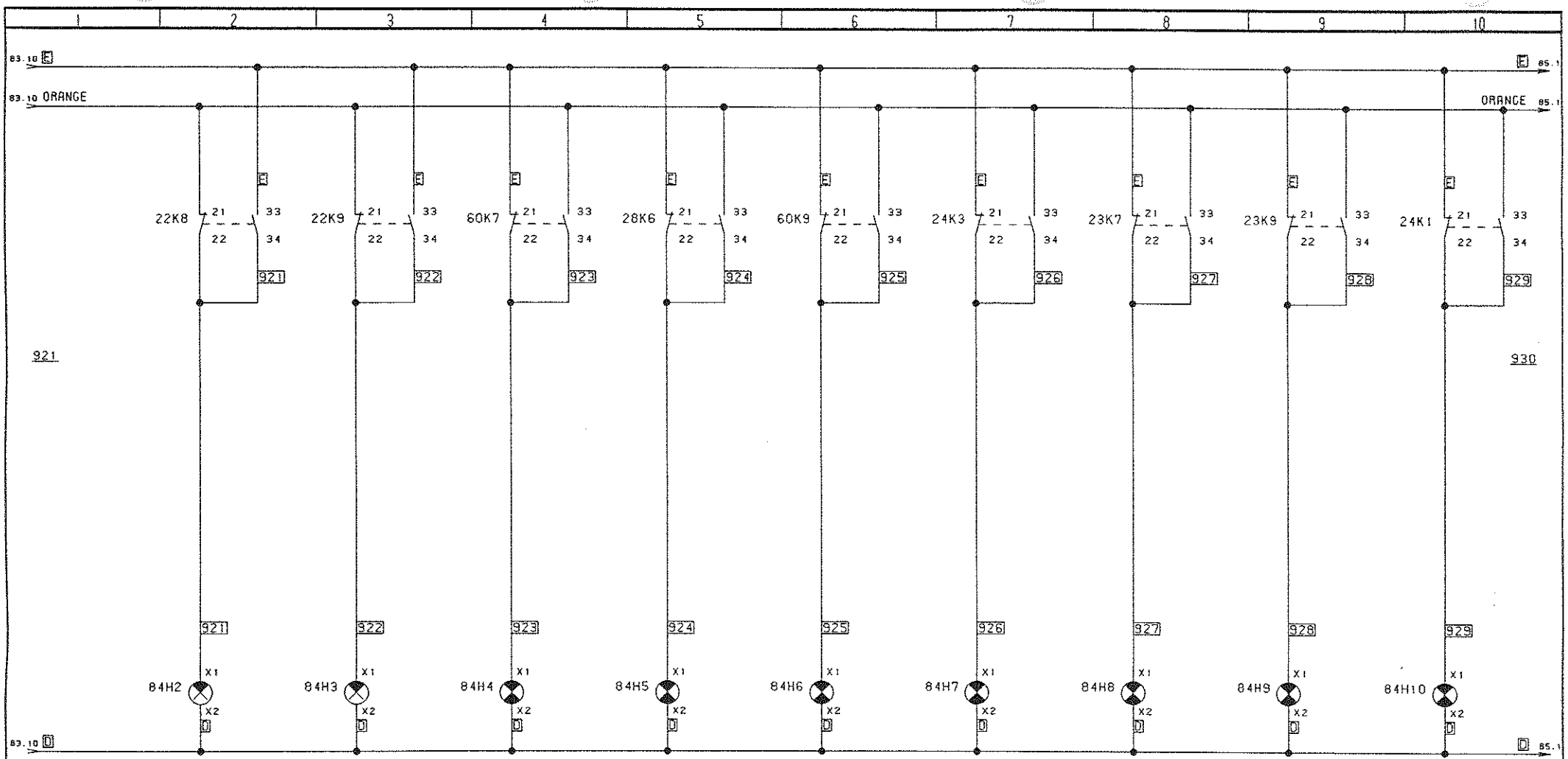
OVERLOAD FUEL OIL TRANSFER PUMP 2

LOW FUEL OIL PRESSURE IN SUPPLY LINE

ENGINEERING	(35113-59374-00609)
FIRM	AALBORG INDUSTRIES
DESIGNATION	* T1850 + T1851
CUSTOMER	00-735214 + 735216

REV.	DESCRIPTION	DATE	BY
1			
2			
3			
4			

SHEET	WIRING DIAGRAM		DRAWER NC
REF	*	PAGE 083	PROJECT MPO
DRAWING NO	01279		DATE 18.05.2001



DIESEL OIL OPERATION

HEAVY FUEL OIL OPERATION

HIGH EXHAUST GAS TEMPERATURE EXHAUST GAS HEATER

BY PASS VALVE OPEN ON EXHAUST GAS HEATER

LEAKAGE CONTROL EXHAUST GAS FIRED HEATER

QUICK CLOSING VALVE EXPANSION TANK ACTIVED

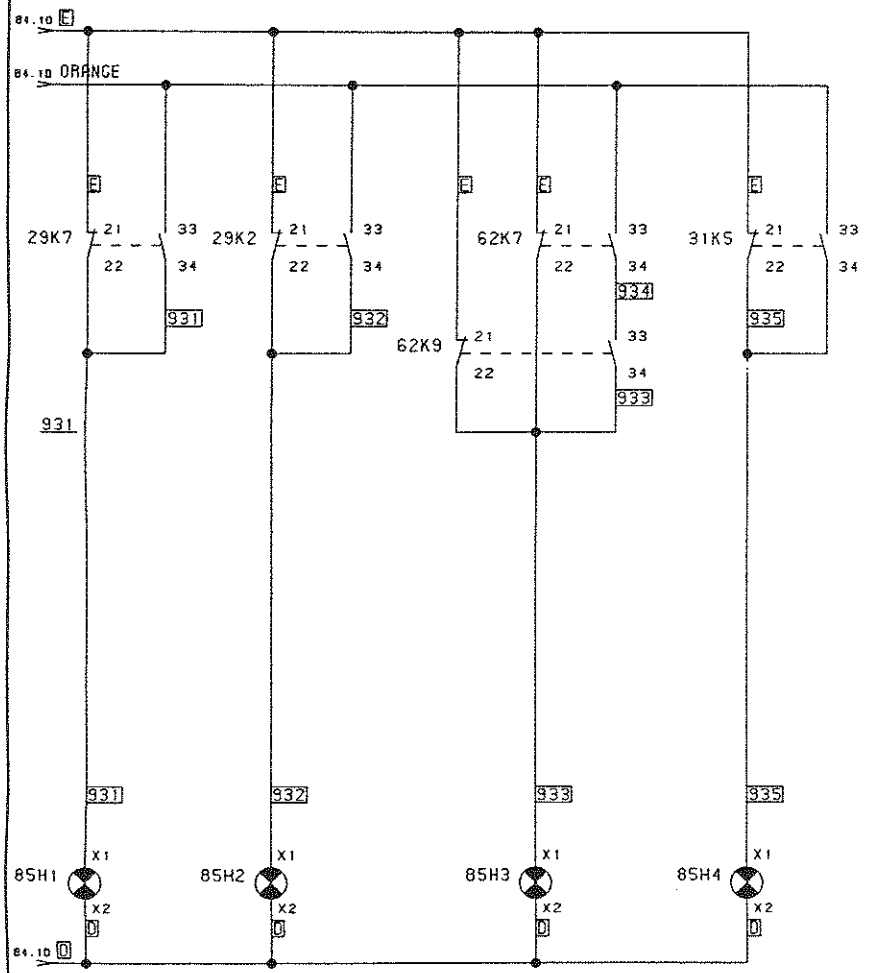
HIGH LEVEL IN EXPANSION TANK

LOW LEVEL ON EXPANSION TANK

TOO LOW LEVEL IN EXPANSION TANK

		REV	DESCRIPTION	DATE	BY
ENGINEERING	(35113-59374-00609)	1			
FIRM	AALBORG INDUSTRIES	2			
DESIGNATION	X T1850 + T1851	3			
CUSTOMER	00-735214 + 735216	4			

SHEET	WIRING DIAGRAM		DRAWER NC
REF	*	PAGE	PROJECT MPO
DRAWING NO	01279	084	DATE 18.05.2001



HIGH TEMP. THERMAL FLUID OIL FIRED HEATER OUTLET

LOW TEMPERATURE IN THERMAL FLUID OIL FIRED HEATER

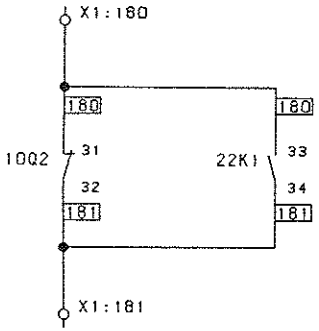
HIGH TEMPERATURE IN COILS AT OIL FIRED HEATER

LOW FUEL OIL TEMPERATURE IN SUPPLY LINE

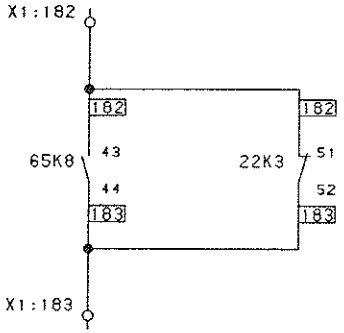
ENGINEERING	(35113-59374-00609)
FIRM	AALBORG INDUSTRIES
DESIGNATION	* T1850 + T1851
CUSTOMER	00-735214 + 735216

REV	DESCRIPTION	DATE	BY
1			
2			
3			
4			

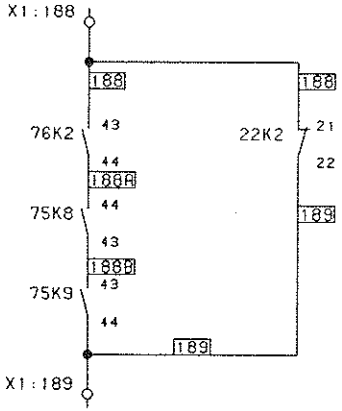
SHEET	WIRING DIAGRAM		DRAWER NC
REF	*	PAGE	PROJECT MPO
DRAWING NO	01279	085	DATE 18.05.2001



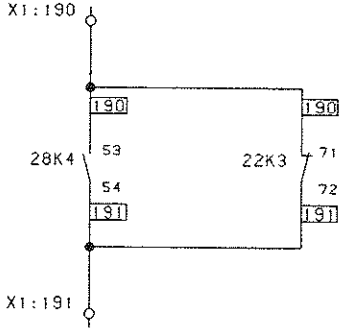
ALARM 1 (180-181)
- POWER SUPPLY FAILURE



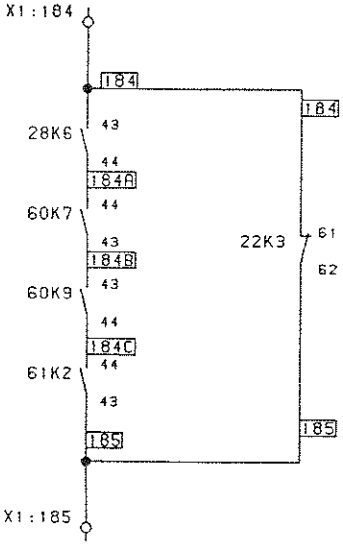
ALARM 2 (182-183)
COMMON ALARM BURNER STOP AT:
- THERMAL FLUID CIRCULATION PUMPS OFF
- HIGH TEMPERATURE IN THERMAL FLUID OIL FIRED HEATER
- BYPASS VALVE OPEN ON OIL FIRED HEATER
- LOW FLOW THERMAL FLUID
- BURNER SWING OUT
- BURNER MOTOR OVERLOAD
- HIGH EXHAUST GAS TEMPERATURE OIL FIRED HEATER
- HIGH FUEL OIL PRESSURE IN BURNER RETURN LINE
- TOO LOW LEVEL EXPANSION TANK
- FLAME FAILURE
- QUICK CLOSING VALVE EXPANSION TANK ACTIVATED
- LEAKAGE CONTROL OIL FIRED HEATER
- LOW FUEL OIL PRESSURE IN RING LINE
- HIGH FUEL OIL TEMPERATURE
- FUEL OIL QUICK CLOSING VALVE CLOSED
- LOW FUEL OIL PRESSURE IN SUPPLY LINE
- LOW COMBUSTION AIR PRESSURE
- HIGH TEMPERATURE IN COIL 1 OIL FIRED HEATER
- HIGH TEMPERATURE IN COIL 2 OIL FIRED HEATER
- LOW FUEL OIL TEMPERATURE
- LOW FUEL OIL TEMPERATURE IN SUPPLY LINE



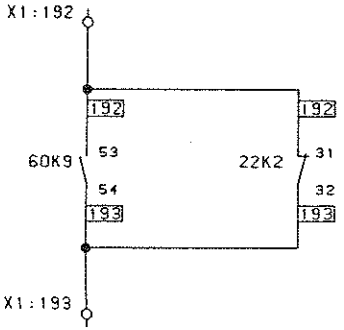
ALARM 5 (188-189)
- AUTO STAND-BY FUEL OIL TRANSFER PUMP
- OVERLOAD FUEL OIL TRANSFER PUMP 1
- OVERLOAD FUEL OIL TRANSFER PUMP 2



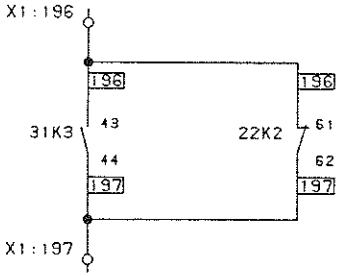
ALARM 6 (190-191)
- LOW FLOW THERMAL FLUID



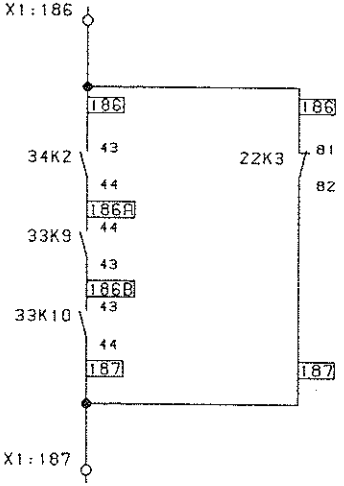
ALARM 3 (184-185)
- BY PASS VALVE OPEN ON EXH.GAS HEATER
- HIGH EXH.GAS TEMP. EXH.GAS HEATER
- LEAKAGE CONTROL EXH.GAS HEATER
- TOO HIGH FLUID OIL TEMP. EXH.GAS HEATER



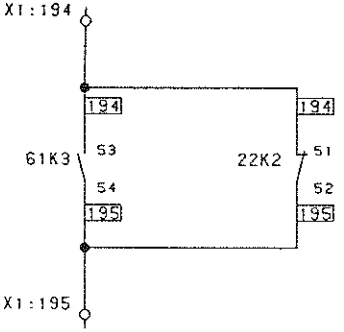
ALARM 7 (192-193)
- LEAKAGE CONTROL EXH.GAS HEATER



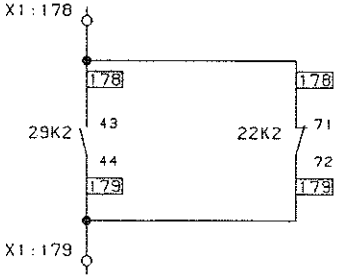
ALARM 9 (196-197)
- OVERLOAD FILLING PUMP



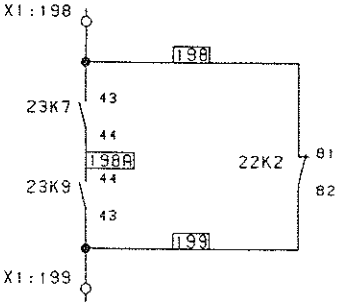
ALARM 4 (186-187)
- AUTO STAND-BY THERMAL FLUID CIRCULATION PUMP
- OVERLOAD THERMAL FLUID CIRCULATION PUMP 1
- OVERLOAD THERMAL FLUID CIRCULATION PUMP 2



ALARM 8 (194-195)
- LEAKAGE CONTROL OIL FIRED HEATER



ALARM 11 (178-179)
- LOW TEMP. IN THERMAL FLUID OIL FIRED HEATER

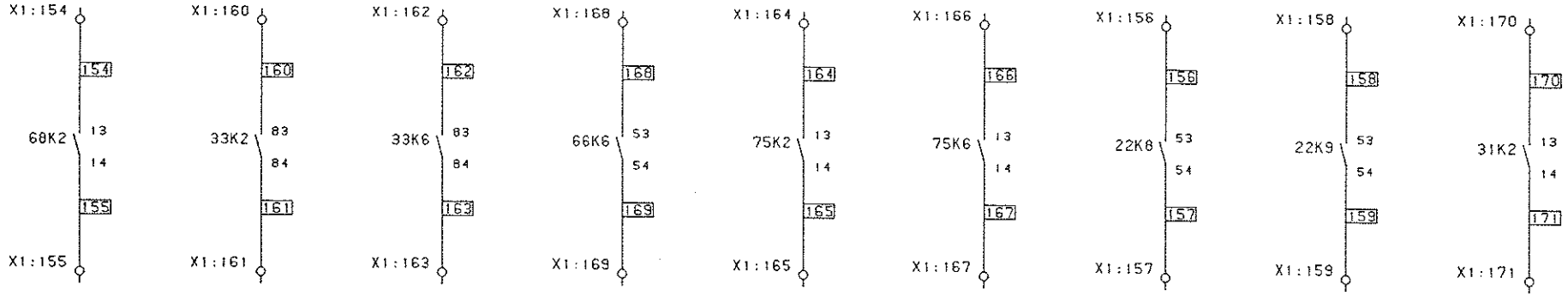


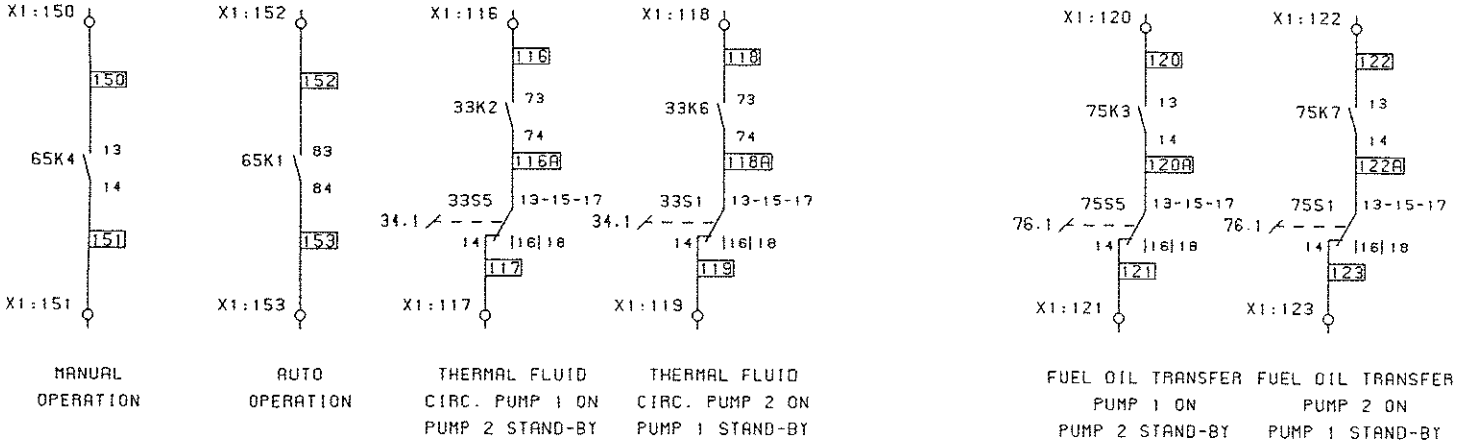
ALARM 10 (198-199)
- HIGH LEVEL EXPANSION TANK
- LOW LEVEL EXPANSION TANK

ENGINEERING	(35113-59374-00609)
FIRM	AALBORG INDUSTRIES
DESIGNATION	* T1850 ÷ T1851
CUSTOMER	00-735214 ÷ 735216

REV	DESCRIPTION	DATE	BY
1			
2			
3			
4			

SHEET	WIRING DIAGRAM		DRAWER NC
REF	*	PAGE	PROJECT MPO
DRAWING NO	01279	086	DATE 18.05.2001

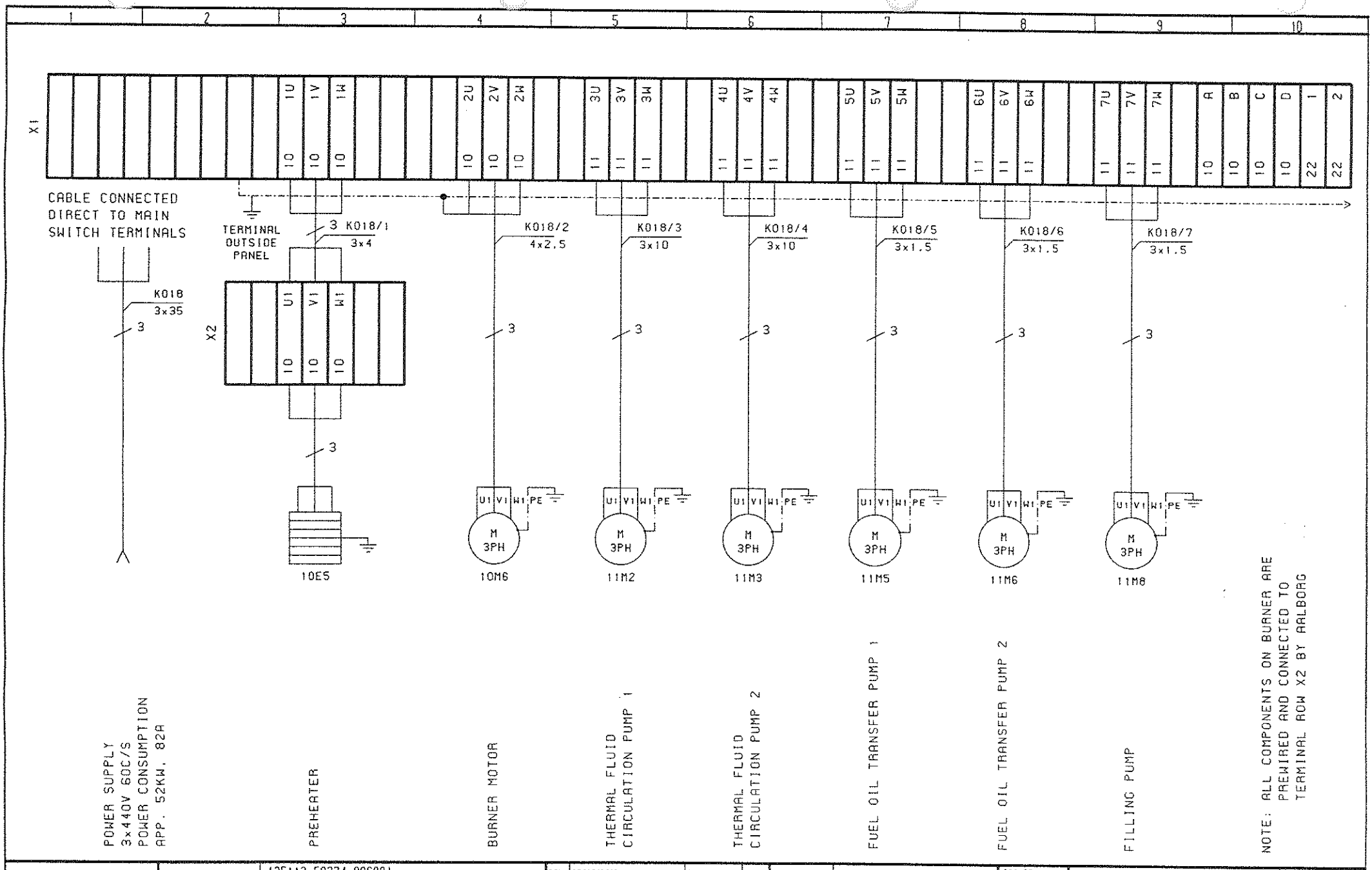




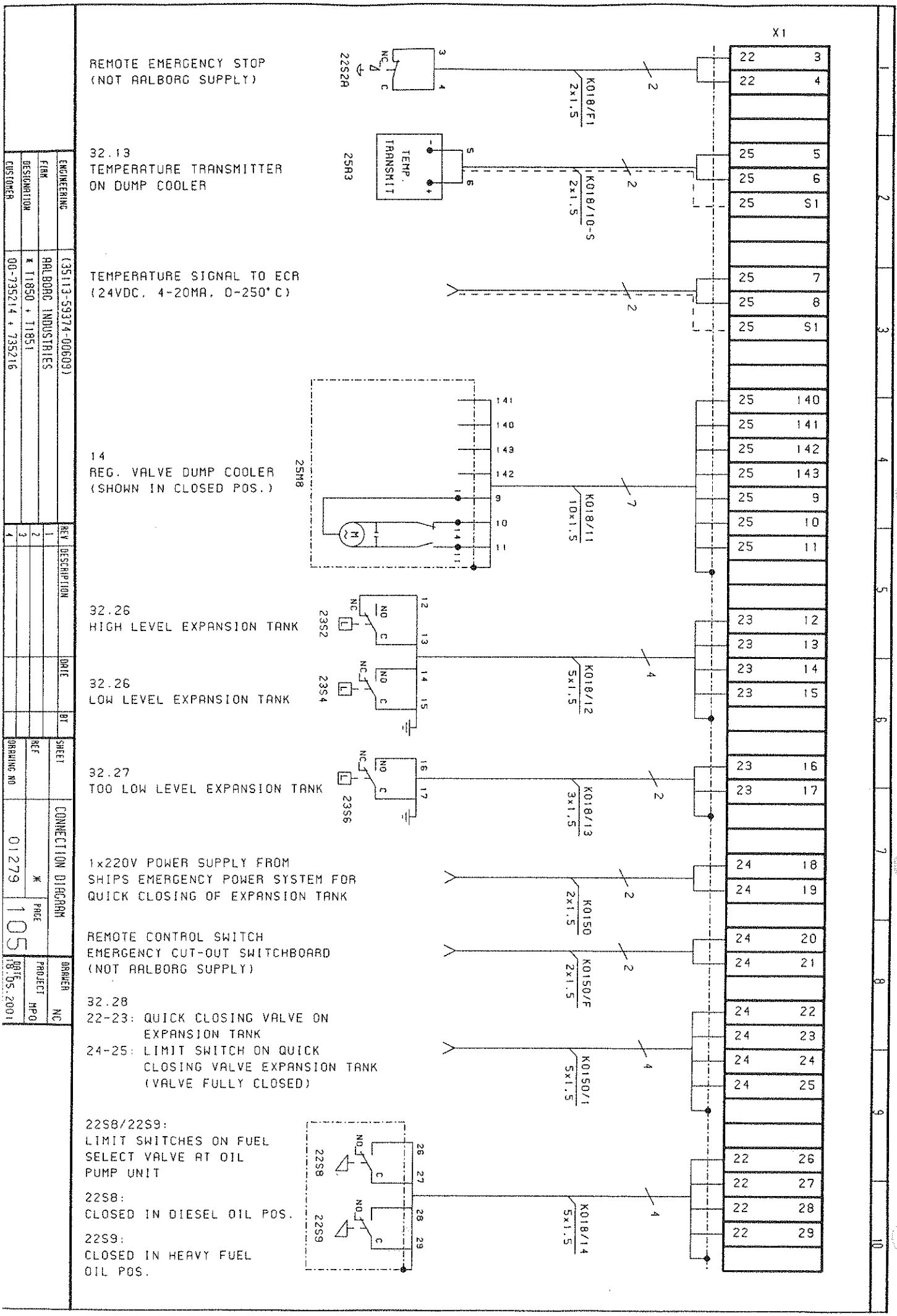
ENGINEERING	(35113-59374-00609)
FIRM	AALBORG INDUSTRIES
DESIGNATION	* T1850 + T1851
CUSTOMER	00-735214 + 735216

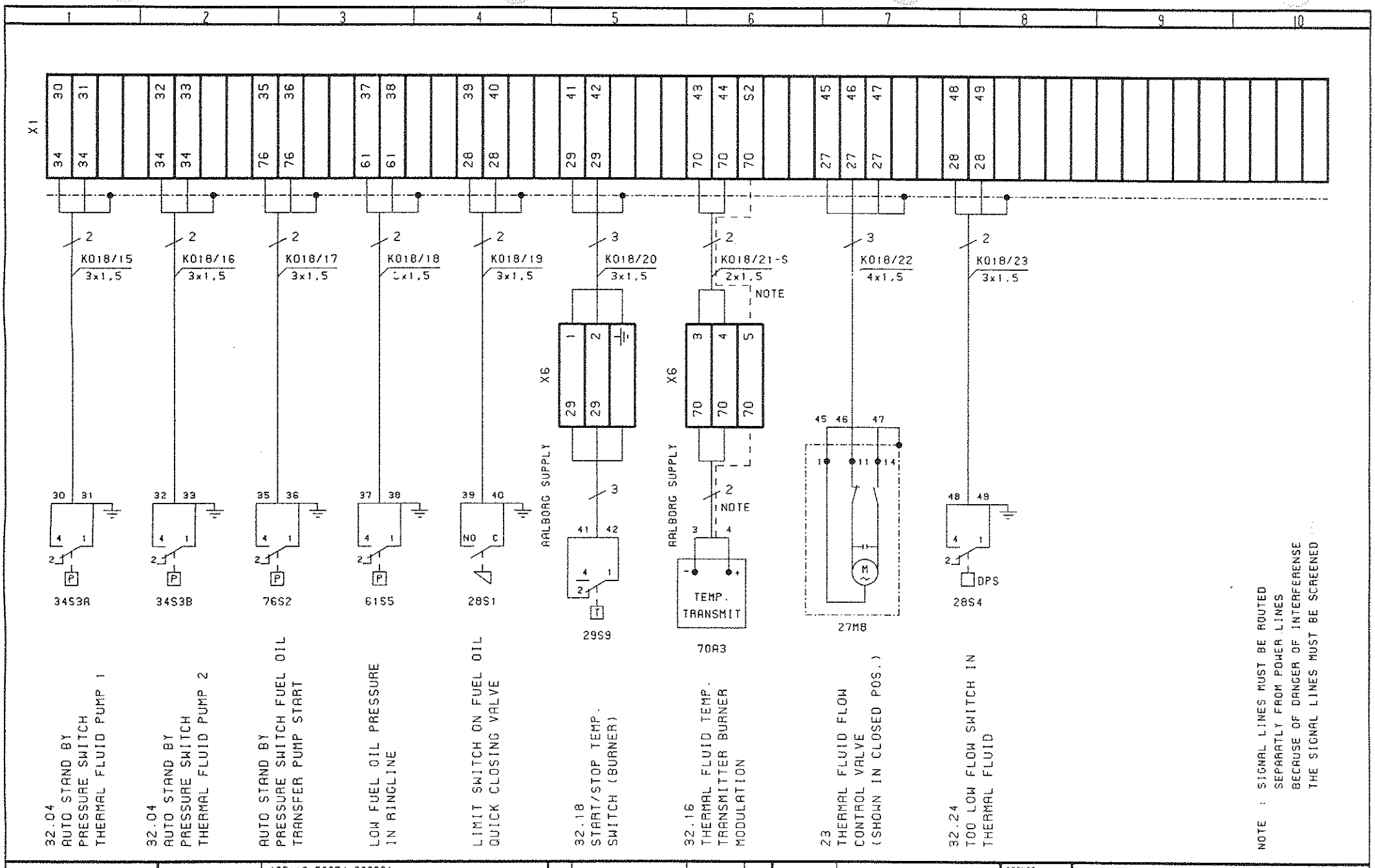
REV	DESCRIPTION	DATE	BY
1			
2			
3			
4			

SHEET	WIRING DIAGRAM		DRAWER NC
REF	*	PAGE	PROJECT MPO
DRAWING NO	01279	088	DATE 18.05.2001

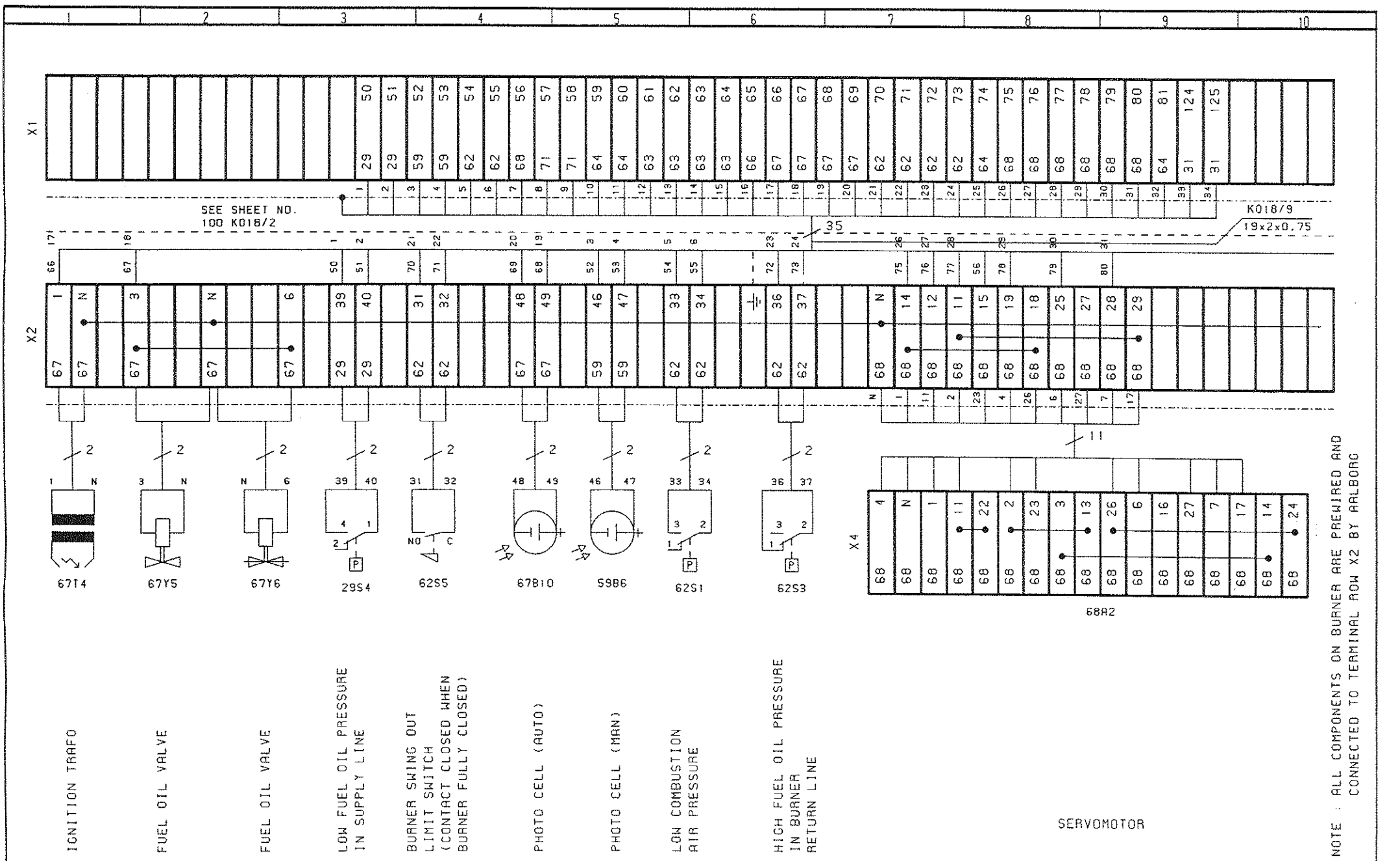


ENGINEERING	(35113-59374-00609)	REV	DESCRIPTION	DATE	BY	SHEET	CONNECTION DIAGRAM		DRAWER NC
FIRM	AALBORG INDUSTRIES	1				REF	*	PAGE	PROJECT MPO
DESIGNATION	* T1850 + T1851	2				DRAWING NO	01279	100	DATE 18.05.2001
CUSTOMER	00-735214 + 735216	3							
		4							


REMOTE EMERGENCY STOP
(NOT AALBORG SUPPLY)
22S2A
K018/F1
2x1.5
32.13
TEMPERATURE TRANSMITTER
ON DUMP COOLER
25A3
TEMP.
TRANSMIT
K018/10-S
2x1.5
TEMPERATURE SIGNAL TO ECR
(24VDC, 4-20MA, 0-250°C)
14
REG. VALVE DUMP COOLER
(SHOWN IN CLOSED POS.)
25M8
K018/11
10x1.5
32.26
HIGH LEVEL EXPANSION TANK
23S2
32.26
LOW LEVEL EXPANSION TANK
23S4
K018/12
5x1.5
32.27
TOO LOW LEVEL EXPANSION TANK
23S6
K018/13
3x1.5
1x220V POWER SUPPLY FROM
SHIPS EMERGENCY POWER SYSTEM FOR
QUICK CLOSING OF EXPANSION TANK
K0150
2x1.5
REMOTE CONTROL SWITCH
EMERGENCY CUT-OUT SWITCHBOARD
(NOT AALBORG SUPPLY)
K0150/F
2x1.5
32.28
22-23: QUICK CLOSING VALVE ON
EXPANSION TANK
24-25: LIMIT SWITCH ON QUICK
CLOSING VALVE EXPANSION TANK
(VALVE FULLY CLOSED)
K0150/1
5x1.5
22S8/22S9:
LIMIT SWITCHES ON FUEL
SELECT VALVE AT OIL
PUMP UNIT
22S8:
CLOSED IN DIESEL OIL POS.
22S9:
CLOSED IN HEAVY FUEL
OIL POS.
K018/14
5x1.5
X1
22 3
22 4
25 5
25 6
25 S1
25 7
25 8
25 S1
25 140
25 141
25 142
25 143
25 9
25 10
25 11
23 12
23 13
23 14
23 15
23 16
23 17
24 18
24 19
24 20
24 21
24 22
24 23
24 24
24 25
22 26
22 27
22 28
22 29
ENGINEERING
FIRM
DESIGNATION
CUSTOMER
(35113-59374-00609)
AALBORG INDUSTRIES
T1850 + T1851
00-735214 + 735216
REV
DESCRIPTION
DATE
BY
SHEET
REF
CONNECTION DIAGRAM
DRAWING NO
01279
PAGE
105
DRAWER
NC
PROJECT
MPO
DATE
18.05.2001



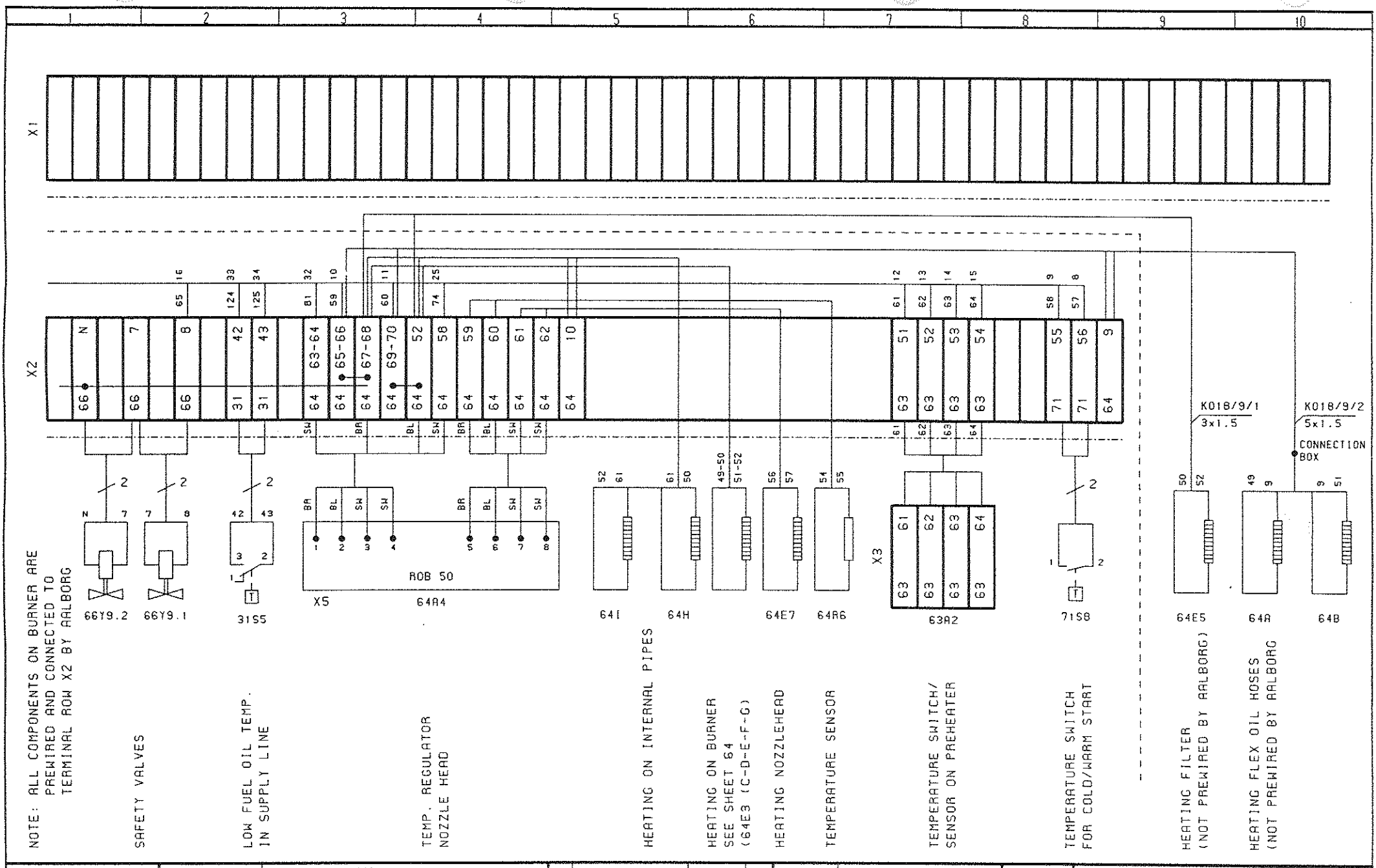
ENGINEERING	(35113-59374-00609)	REV	DESCRIPTION	DATE	BY	SHEET	CONNECTION DIAGRAM		DRAWER NC
FIRM	AALBORG INDUSTRIES	1							
DESIGNATION	* T1850 + T1851	2				REF	*	PAGE	PROJECT MPO
CUSTOMER	00-735214 + 735216	3				DRAWING NO	01279	106	DATE 18.05.2001
		4							



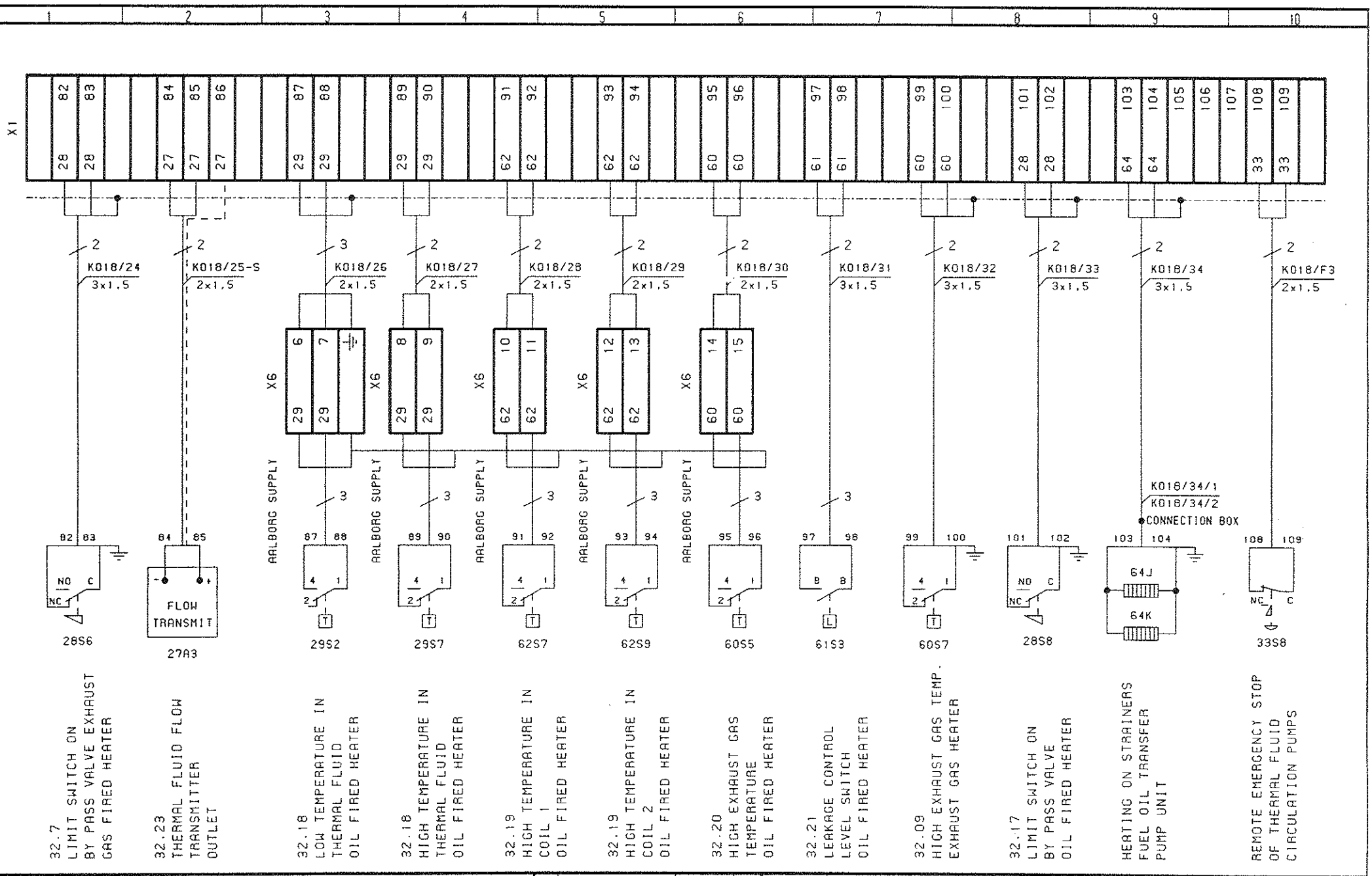
ENGINEERING	(35113-59374-00609)
FIRM	AALBORG INDUSTRIES
DESIGNATION	* T1850 + T1851

REV	DESCRIPTION	DATE	BY
1			
2			
3			

SHEET	CONNECTION DIAGRAM		DRAWER NC
REF	*	PAGE 107	PROJECT MPO
DRAWING NO	01279		DATE



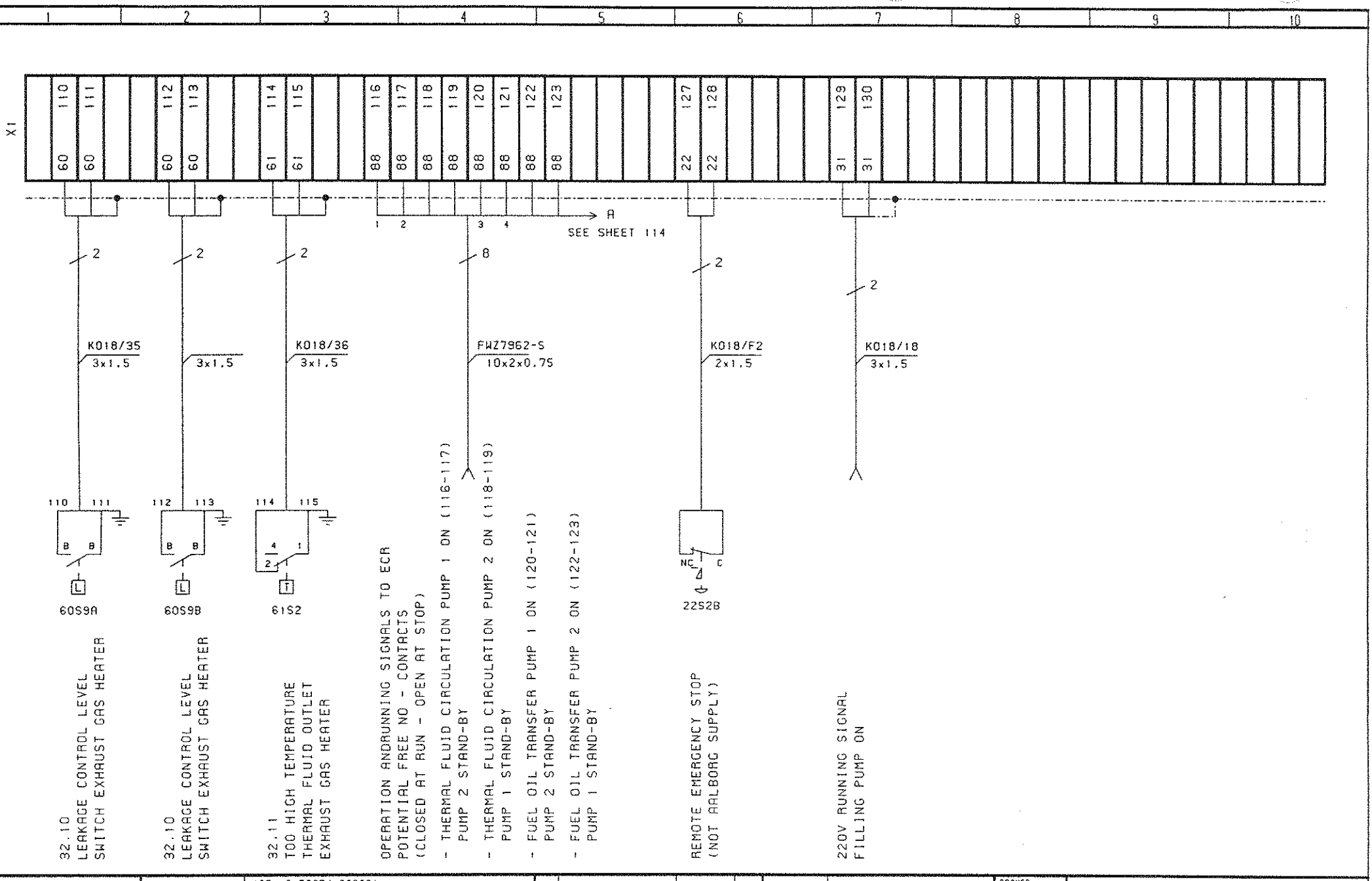
ENGINEERING	(35113-59374-00609)	REV	DESCRIPTION	DATE	BY	SHEET: CONNECTION DIAGRAM
FIRM	AALBORG INDUSTRIES	1				REF: * PAGE: 108
DESIGNATION	* T1850 + T1851	2				DRAWING NO: 01279
CUSTOMER	00-735214 + 735216	3				DRAWER: NC
		4				PROJECT: MPO
						DATE: 18.05.2001



ENGINEERING	(35113-59374-00609)
FIRM	AALBORG INDUSTRIES
DESIGNATION	* T1850 ; T1851

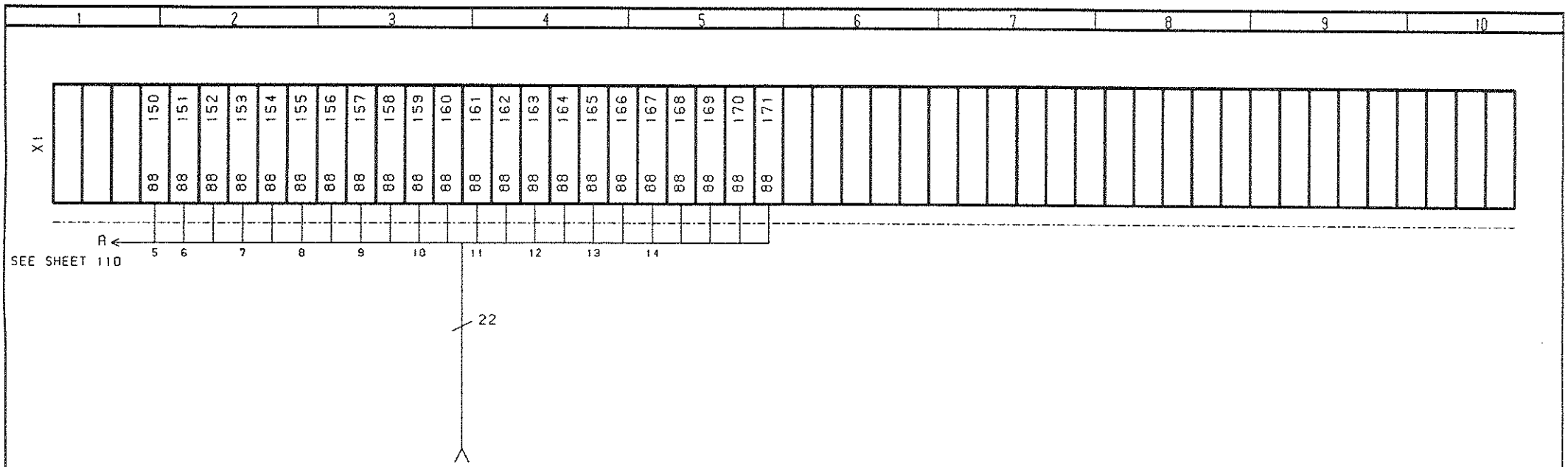
REV	DESCRIPTION	DATE	BY
1			
2			
3			

SHEET	CONNECTION DIAGRAM		DRAWER NC
REF	*	PAGE 109	PROJECT MPO
DRAWING NO	01279		DATE



		REV	DESCRIPTION	DATE	BY
ENGINEERING	(35113-59374-00609)	1			
FIRM	AALBORG INDUSTRIES	2			
DESIGNATION	* T1850 + T1851	3			
CUSTOMER	00-735214 + 735216				

SHEET	CONNECTION DIAGRAM		DRAWER NC
REF	*	PAGE 110	PROJECT MPO
DRAWING NO	01279		DATE 18 OS 2001



OPERATION AND RUNNING SIGNALS TO ECR
POTENTIAL FREE NO-CONTACTS
(CLOSED AT RUN - OPEN AT STOP)

MANUAL OPERATION (150-151)

AUTO OPERATION (152-153)

BURNER OPERATION ON (154-155)

DIESEL OIL OPERATION (156-157)

HEAVY FUEL OIL OPERATION (158-159)

THERMAL FLUID CIRCULATION PUMP 1 ON (160-161)

THERMAL FLUID CIRCULATION PUMP 2 ON (162-163)

FUEL OIL TRANSFER PUMP 1 ON (164-165)

FUEL OIL TRANSFER PUMP 2 ON (166-167)

OIL BURNER MOTOR ON (168-169)

FILLING PUMP ON (170-171)

ENGINEERING	(35113-59374-00609)	REV	DESCRIPTION	DATE	BY	SHEET	CONNECTION DIAGRAM	DRAWER NC
FIRM	AALBORG INDUSTRIES	1				REF	*	PAGE 114
DESIGNATION	* T1850 + T1851	2						PROJECT MPO
	00-735214 + 735216	3				DRAWING NO	01279	DATE

ALARM SIGNAL TO ECR
POTENTIAL FREE NO-CONTACTS
(CLOSED AT NON ALARM - OPEN AT ALARM)

ALARM 1 (180-181)
- POWER SUPPLY FAILURE

ALARM 2 (182-183)
COMMON ALARM BURNER STOP AT:
- BY PASS VALVE OPEN ON OIL FIRED HEATER
- LOW FLOW THERMAL FLUID
- LOW COMBUSTION AIR PRESSURE
- LOW FUEL OIL PRESSURE IN RING LINE
- HIGH FUEL OIL PRESSURE IN BURNER RETURN LINE
- HIGH EXHAUST GAS TEMPERATURE OIL FIRED HEATER
- HIGH FUEL OIL TEMPERATURE
- LOW FUEL OIL TEMPERATURE
- BURNER SWING OUT
- FUEL OIL QUICK CLOSING VALVES CLOSED
- FLAME FAILURE
- BURNER MOTOR OVERLOAD
- LOW FUEL OIL PRESSURE IN SUPPLY LINE
- QUICK CLOSING VALVE EXPANSION TANK ACTIVATED
- TOO LOW LEVEL IN EXPANSION TANK
- HIGH TEMPERATURE IN COILS AT OIL FIRED HEATER
- HIGH TEMPERATURE THERMAL FLUID OIL FIRED HEATER OUTLET
- THERMAL CIRCULATION PUMPS OFF
- LEAKAGE CONTROL OIL FIRED HEATER
- LOW FUEL OIL TEMPERATURE
- LOW FUEL OIL TEMPERATURE IN SUPPLY LINE

ALARM 3 (184-185)
COMMON ALARM EXHAUST GAS HEATER:
- BY PASS VALVE OPEN ON EXH.GAS HEATER
- HIGH EXHAUST GAS TEMP. EXH.GAS HEATER
- LEAKAGE CONTROL EXH.GAS HEATER
- TOO HIGH FLUID OIL TEMP. EXH.GAS HEATER

ALARM 4 (186-187)
- AUTO STAND BY THERMAL FLUID CIRCULATION PUMP STARTED
- OVERLOAD THERMAL FLUID PUMP 1
- OVERLOAD THERMAL FLUID PUMP 2

ALARM 5 (188-189)
- AUTO STAND BY FUEL OIL TRANSFER PUMP STARTED
- OVERLOAD FUEL OIL TRANSFER PUMP 1
- OVERLOAD FUEL OIL TRANSFER PUMP 2

ALARM 6 (190-191)
- LOW THERMAL FLUID FLOW

ALARM 7 (192-193)
- LEAKAGE CONTROL EXHAUST GAS BOILER

ALARM 8 (194-195)
- LEAKAGE CONTROL OIL FIRED HEATER

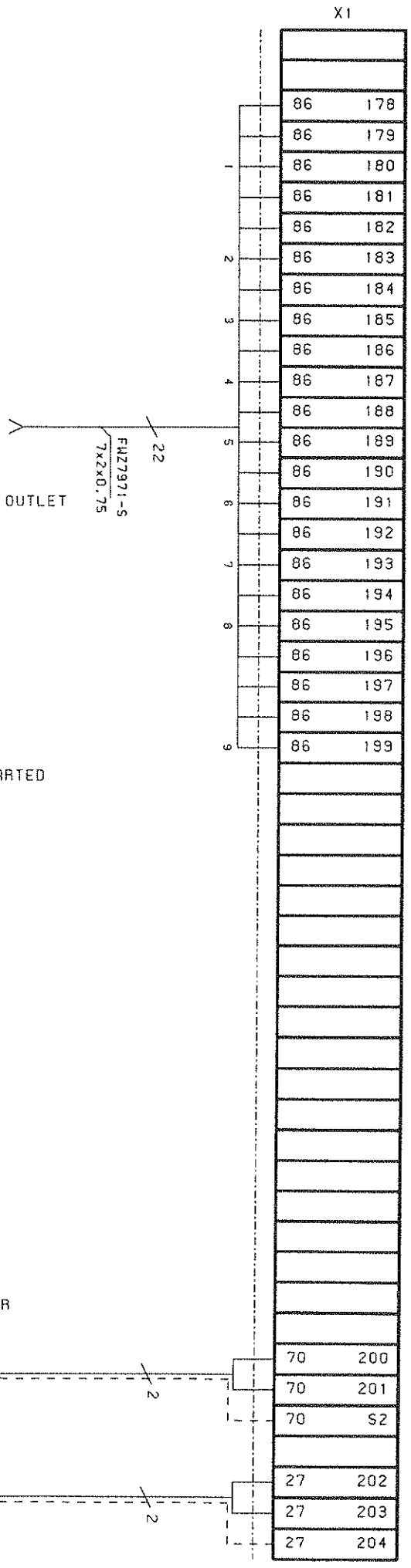
ALARM 9 (196-197)
- OVERLOAD FILLING PUMP

ALARM 10 (198-199)
- HIGH LEVEL EXPANSION TANK
- LOW LEVEL EXPANSION TANK

ALARM 11 (178-179)
- LOW TEMPERATURE IN THERMAL FLUID OIL FIRED HEATER

THERMAL FLUID TEMP. SIGNAL - OPTIONAL
(24VDC, 4-20MA, 0-250° C)

THERMAL FLUID FLOW SIGNAL - OPTIONAL
(24VDC, 4-20MA)



CUSTOMER	
DESIGNATION	* T1850 + T1851
FIRM	AALBORG INDUSTRIES
ENGINEERING	(35113-59374-00609)
00-735214 + 735216	

REV	DESCRIPTION	DATE	BY
1			
2			
3			
4			

DRAWING NO	01279
SHEET	CONNECTION DIAGRAM
REF	*
PAGE	11 5
DRAWER	NC
PROJECT	MPO
DATE	18.05.2001

DESIGNATION	TYPE			USE
MAIN SWITCH	QM 25 - A + AUX. CONTACT + LOCKABLE HANDLEKNOP			
	QM 40 - B + AUX. CONTACT			
	QM 80 - B + AUX. CONTACT			
	QM 100 - B + AUX. CONTACT			10Q2
	QA 125 - N1 + AUX. CONTACT			
SWITCH	P 220 640376	219M1		
	P 220 640441	219M1		22S3
	P 220 640442	219M1		
	P 220 61037	253S1		65S2
	P 220 DK0159	219M1		68S8
	P 220 DK0526	219M1		
	P 220 DK0616	219M1		65S1
	P 220 61199	206B4		
	P 220 049	219M1		
	P 220 61001	219M1		
	P 220 61025	219M1		
	P 220 61037	219M1		31S2
	P 220 61039	219M1		
	P 220 61069	219M1		
	P 220 61070	219M1		
	P 220 61089	219M1		33S(1-5), 75S(1-5)
	P 220 61300	219M1		
	P 220 61637	219M1		
PUSH BUTTON	XB4-BA21			22S10
	RPV+PL-RPV+BE3+EK01 ZBY8330			22S3A
	ZBE101			22S10(1PCS)
	ZBE102			
AUT. FUSE				
	C60N/C	4 A	24334	10F7
	C60N/C	6 A	24335	10F9
	C60L/K	10 A	25485	
	C60L/B	25 A	25374	
MOTOR CIRCUIT BREAKER	GV2-P06 + GV2-AN11	1-1.6A		11Q(5-6)
	GV2-P10 + GV2-AN11	4-6.3A		11Q8
	GV2-P14	6-10A		
	GV2-P20 + GV2-AN11	13-18A		10Q6
	GV2-P21	17-23A		10Q5
	GV3-M63 + GV1-A01	40-63A		11Q(2-3)
	GV2-L10	6,3A		10Q8

		REV	DESCRIPTION	DATE	BY
ENGINEERING	(35113-59374-00609)	1			
FIRM	AALBORG INDUSTRIES	2			
DESIGNATION	* T1850 + T1851	3			
CUSTOMER	00-735214 + 735216	4			

SHEET	LIST OF PARTS		DRAWER NC
REF	*	PAGE	PROJECT MPO
DRAWING NO	01279	132	DATE 18.05.2001

1	2	3	4	5	6	7	8	9	10

DESIGNATION	TYPE		USE
CONTACTOR	LC1-D0910-P7		31K2, 75K(2-6)
	LC1-D1210-P7		63K(2-5)
	LC1-D1810-P7		66K6
	LC1-D2510-P7		
	LC1-D3210-P7		
	LC1-D4011-P7		
	LC1-D5011-P7		33K(2-6)
OVERLOAD RELAY	LR2-D	0,25-0,40A	
	LR2-D	0,40-0,63A	
	LR2-D	0,63-1,0A	
	LR2-D	1,0-1,6A	
	LR2-D	1,25-2,0A	
	LR2-D	1,6-2,5A	
	LR2-D	2,5-4,0A	
	LR2-D	4,0-6,0A	
	LR2-D	5,5-8,0A	
	LR2-D	7,0-10,0A	
	LR2-D	9,0-13,0A	
	LR2-D	12,0-18,0A	
	LR2-D	17,0-25,0A	
	LR2-D	23,0-32,0A	
	LR2-D	28,0-36,0A	
	LR2-D	23,0-32,0A	
	LR2-D	30,0-40,0A	
AUX. RELAY	CA2-DN31	P7	22K(1-8-9), 23K(7-9), 24K(1-2-3-4-6), 25K(1-2), 27K(1-2), 28K(1-2-4-5-6-8-9), 29K(2-4-5-6-7-9),
			31K(3-5-6-9-10), 33K(9-10), 34K(6-7), 59K(2-3), 60K(5-7-9), 61K(2-3-4-7-8-9-10), 62K(1-2-5-6-7-8-9-10)
			63K(1-7-8), 65K(1-3-4-8), 68K2, 70K(1-2), 71K(4-6-8), 75K(3-7-8-9), 60K6
	CA2-DN22	P7	22K2, 34K2, 65K2, 66K2, 66K7, 67K7, 76K2
	CA2-DN40	P7	22K(3-4-5-6-7)
AUX. RELAY BLOCK	LA1-DN01		
	LA1-DN10		
	LA1-DN11		22K(8-9), 34K2, 60K9, 63K5, 65K2, 76K2
	LA1-DN20		
	LA1-DN02		
	LA1-DN13		
	LA1-DN22		75K(2-6)
	LA1-DN31		31K2, 33K(2-6), 65K3
	LA1-DN40		22K(4-5-6), 65K1, 66K6
	LA1-DN04		22K(2-3)
	LA1-DC22		24K(1-2-3-4), 28K(1-2-4-5-8-9), 29K(4-5-6-7), 31K(5-6-9-10), 34K(6-7), 59K(2-3), 60K(5-6), 61K(3-4-7-8-9-10),
			62K(1-2-5-6-7-8-9-10), 63K(1-2-7-8), 67K7, 71K6

ENGINEERING	(35113-59374-00609)
FIRM	AALBORG INDUSTRIES
DESIGNATION	* T1850 + T1851
CUSTOMER	00-735214 + 735216

REV	DESCRIPTION	DATE	BY
1			
2			
3			
4			

SHEET	LIST OF PARTS		DRAWER NC
REF	*	PAGE 133	PROJECT MPO
DRAWING NO	01279		DATE 18.05.2001

1	2	3	4	5	6	7	8	9	10

DESIGNATION	TYPE	USE
TIMER	RE4 TL 11 BU	33K(1-5), 71K(5-7), 76K7
	RE4 TP 13 BU	66K8, 67K2, 71K(2-3)
	RE4 AM 11 BU	23K(1-3-5), 60K3, 61K6, 62K3
	RE4 RL 13 BU	
	RE4 PP 13 BU	22K10
	RE4 RB 11 MW	34K8
SIGNAL LAMP	XB4-BVB3 - GREEN	81H(4-8-9-10), 82H(4-5-6), 83H(2-3-5)
	XB4-BVB4 - RED	80H(4-5-6-7-8-9-10), 81H(2-3-5-6-7), 82H(2-3-8-9-10), 83H(4-6-7-8-9), 84H(4-5-6-7-8-9-10), 85H(1-2-3-4)
	XB4-BVB5 - YELLOW	82H7
	XB4-BVB6 - BLUE	84H(2-3)
	XB4-BVB1 - WHITE	80H(1-3)
	XB4-BVM5 - YELLOW	24H8
TRANSFORMER	TA-1,25	10T8
CONTROL BOX	LAL 2.25	
	LOK 16	65A9
THERMAL OIL DUMP COOLER CONTROLLER	SIPART 6DR 2100-5	25A2
THERMAL FLUID FLOW CONTROLLER		
	SIPART 6DR 2100-5	27A2
TEMPERATURE CONTROLLERS	CROW - 54/2	63A4
LOAD CONTROLLER	SIPART 6DR 2100-5	70A2
POWER SUPPLY	SITOP 2A	70A7
FLAME RELAY	LAE 10	59A4
TERMINALS	WK	
WIRING	NKT - PVT	

		REV	DESCRIPTION	DATE	BY
ENGINEERING	(35113-59374-00609)	1			
FIRM	AALBORG INDUSTRIES	2			
DESIGNATION	* T1850 , T1851	3			
CUSTOMER	00-735214 , 735216	4			

SHEET	LIST OF PARTS		DRAWER NC
REF	*	PAGE	PROJECT MPO
DRAWING NO	01279	134	DATE 18.05.2001

1	2	3	4	5	6	7	8	9	10

ITEM NO. IN DRAWING

1) LIST OF MOUNTINGS : AQ16
2) BOILER GAUGE BOARD : K11
3) BURNER DRAWING :
4) PIPING DIAGRAM : M:
5) EL-WIRING DIAGRAM : 01279

ITEM	UNITS	RANGE	SET POINT (PROPOSAL)	TYPE	INDICATOR ID-NO. IN WIRING DIAGRAM	1	2	3	4	5	ELEMENT TERMINAL NO. IN WIRING DIAGRAM	ALARM OUTPUT TERMINAL IN WIRING DIAGRAM	BURNER TRIP	PHYSICAL LOCATION	REMARKS
SAFETY VALVE	BAR			25.901		1									
START/STOP TEMPERATURE SWITCH	°C		180/195		82H7					29S9	41-42			BOILER	
BURNER LOAD TEMP. TRANSMITTER	°C mA	0-250 4-20		81.37.173						70A3	43-44			HEATER	
BURNER LOAD SET POINT - W	°C	0-250	185	6DR-2001-1	70A2					70A2				PANEL	
HIGH FUEL OIL TEMPERATURE SWITCH	°C		180	MW	81H3					63B3	61-62	182-183	X	BURNER	
LOW FUEL OIL TEMPERATURE SWITCH	°C	NOT ADJ	80	CROW 54/2	81H5					63A4		182-183	X	PANEL	
PREH. TEMP. CONTROL SWITCH/SENSOR	°C	0-160	150	CROW 54/2	81H4					63A4				PANEL	
NOZZLE HEAD TEMP. CONTROLLER	°C	80 OR 130	100	MW ROB 50						64A4				BURNER	
LOW TEMPERATURE NOZZLE HEAD	°C	80 OR 130	80	MW ROB 50						64A4				BURNER	
COLD/WARM START TEMP. SWITCH	°C	NOT ADJ	60	MW						71S8	57-58			BURNER	
HIGH TEMP. IN COIL 1 O.F.H.	°C		240		85H3					62S7	91-92	182-183	X		
HIGH TEMP. IN COIL 2 O.F.H.	°C		240		85H3					62S9	93-94	182-183	X		
LOW COMBUSTION AIR PRESSURE	BAR		15		80H7					62S1	54-55	182-183	X		
OIL PRESSURE ON BURNER	BAR		28	MW								182-183	X	BURNER	
HIGH FUEL OIL PRESS. BNR RETURN LINE	BAR		8	MW	80H10					62S3	72-73	182-183	X	OIL LINE	
LOW FUEL OIL PRESSURE RINGLINE	BAR		1	RT 200	80H8					61S5	37-38	182-183	X	OIL LINE	
LOW FUEL OIL TEMP. IN SUPPLY LINE	°C				85H4					31S5	124-125	182-183	X		
STAND BY FUEL OIL PUMP START	BAR		1,5	RT 200	83H4					76S2	35-36	188-189		OIL LINE	
LOW FUEL OIL PRESSURE IN SUPPLY LINE	BAR		22		83H9					29S4	50-51	182-183	X		
LOW THERMAL FLUID FLOW SWITCH	BAR		0,3		80H6					28S4	48-49	182-183+190-191	X		
BY PASS VALVE EXH. HEATER	LIM.SW				84H5					28S6	82-83	184-185			
BY PASS VALVE OIL FIRED HEATER	LIM.SW				80H5					28S8	101-102	182-183	X		
LOW THERMAL FLUID TEMP. O.F.H.	°C		140		85H2					29S2	87-88	178-179			
HIGH THERMAL FLUID TEMP. O.F.H.	°C		230		85H1					29S7	89-90	182-183	X		
DUMP COOLER TEMP. TRANSMITTER	°C mA	0-250 4-20		81.37.173						25A3	5-6			HEATER	
DUMP COOLER CONTROLLER SET POINT - W	°C	0-250	215	6DR-2001-1	25A2					25A2				PANEL	
FLOW TRANSMITTER THERMAL OIL	m³/HOUR/mA	0-100/4-20		1151 DP4S22						27A3	84-85			FLOW LINE	100m³/H CORRECPOND TO DP=1948 mm WC
THERMAL FLUID FLOW CONTROLLER SET POINT - W	m³/HOUR	0-100	77							27A2				PANEL	
HIGH LEVEL SWITCH EXPANSION TANK	mm		1100							23S2	12-13	198-199		EXP. TANK	
LOW LEVEL SWITCH EXPANSION TANK	mm		400							23S4	14-15	198-199		EXP. TANK	
TOO LOW LEVEL SWITCH EXPANSION TANK	mm	NOT ADJ	200							23S6	16-17	182-183	X	EXP. TANK	
AUT.ST.BY PRESS.SWITCH THERMAL PUMP 1	BAR		4,5		82H10					34S3A	30-31	186-187	X	PANEL	
AUT.ST.BY PRESS.SWITCH THERMAL PUMP 2	BAR		4,5		82H10					34S3B	32-33	186-187	X		
HIGH EXHAUST GAS TEMP. O.F.H.	°C	400			81H2					60S5	95-96	182-183	X		
HIGH EXHAUST GAS TEMP. EXH.GAS H.	°C	400			84H4					60S7	99-100	184-185			
LEAKAGE CONTROL EXH. GAS HEATER					84H6					60S9A+B	110-111+112-113	184-185			
LEAKAGE CONTROL O.F.H.					80H9					61S3	97-98	182-183	X		
TOO HIGH FLUID OIL TEMP. EXH.GAS H.	°C		250		80H4					61S2	114-115	184-185			

ENGINEERING	(35113-59374-00609)	REV	DESCRIPTION	DATE	BY	SHEET	LIST OF SET POINTS	DRAWER	NC
FIRM	AALBORG INDUSTRIES	1				REF	*	PAGE	
DESIGNATION	* T1850 + T1851	2				DRAWING NO	01279	PROJECT	MPO
CUSTOMER	00-735214 + 735216	3					135	DATE	18.05.2001
		4							

1	2	3	4	5	6	7	8	9	10

ITEM NO. IN DRAWING:
1) LIST OF MOUNTINGS : AQ16
2) BOILER GRUGE BOARD : K11
3) BURNER DRAWING :
4) PIPING DIAGRAM : M:
5) EL-WIRING DIAGRAM : 01279

ITEM	UNITS	RANGE	SET POINT (PROPOSAL)	TYPE	INDICATOR ID-NO. IN WIRING DIAGRAM	1	2	3	4	5	ELEMENT TERMINAL NO. IN WIRING DIAGRAM	ALARM OUTPUT TERMINAL IN WIRING DIAGRAM	BURNER TRIP	PHYSICAL LOCATION	REMARKS
POWER FAILURE					80H1							180-181	X	PANEL	
BURNER SWING OUT	LIM.SW			MW	81H6					62S5	70-71	182-183	X	BURNER	
FLAME FAILURE AUTO				RAR7/LAL2.25	82H2					67B10	68-69	182-183	X	BURNER	
QUICK CLOSING VALVE	LIM.SW			MW	81H7					28S1	39-40	182-183	X	OIL LINE	
FLAME FAILURE MAN				RAR7/LAE10	82H2					59(A4-B6)	52-53	182-183	X	BURNER	
QUICH CLOSING VALVE EXPANSION TANK	LIM.SW				24H8 + 84H7					24S8	22-23-24-25	182-183	X	EXP.TANK	
THERMAL OVERLOAD RELAYS:															
THERMAL FLUID CIRCULATION PUMP 1	A	40-63	40.5	GV3M	82H8					11Q2		186-187	X	PANEL	
THERMAL FLUID CIRCULATION PUMP 2	A	40-63	40.5	GV3M	82H9					11Q3		186-187	X	PANEL	
FILLING PUMP	A	4-6.3	4.65	GV2M	83H6					11Q8		196-197		PANEL	
BURNER MOTOR	A	13-18	13.5	GV2M	82H3					10Q6		182-183	X	PANEL	
FUEL OIL TRANSFER PUMP	A	1-1.6	1.2	GV2M	83H7					11Q5		188-189		PANEL	
FUEL OIL TRANSFER PUMP	A	1-1.6	1.2	GV2M	83H8					11Q6		188-189		PANEL	
TIMERS															
DELAY THERMAL FLUID PUMP OFF	SEC.	1.5-30	5	ARS						34K8					
DELAY AUT.START AFTER POWER FAILURE	SEC.	1.5-30	3	VWS						22K10					
DELAY HIGH LEVEL EXPANSION TANK	SEC.	1.5-30	15	AHS						23K1					
DELAY LOW LEVEL EXPANSION TANK	SE.	1.5-30	15	AHS						23K3					
DELAY TOO LOW LEVEL EXPANSION TANK	SEC.	1.5-30	15	AHS						23K5					
DELAY ST.BY THERMAL FLUID PUMP 1	SEC.			ERS						33K1					
DELAY ST.BY THERMAL FLUID PUMP 2	SEC.			ERS						33K5					
DELAY MAN. FLAME FAILURE	SEC.	1.5-30	MAX. 5	AHS						60K3					TIME SET DURING COMMISIORING
DELAY LOW FUEL OIL PRESSURE IN RINGLINE	SEC.		5	AHS						61K6					
DELAY HIGH FUEL OIL PRESS.BNR.RETUR.LINE	SEC.	0.5-10	5	AHS						62K3					
DELAY ING. MAN MODE	SEC.	5-100	100	ERS						67K2					
PRE.CIRC. OF HFO MODE	SEC.		APPr 40							71K3					TIME SET DURING COMMISIONING
PRE. HEAT OF OIL HFO MODE	SEC.	5-100	APPr 10	ERS						71K2					TIME SET DURING COMMISIONING
DELAY COLD WARM START SYSTEM	SEC.	0.15-3.0	0.5	ERS						71K5					
DELAY AUT ST.BY/FUEL OIL TRANSFER PUMP	SEC		5	ERS						76K7					
DELAY LOW OIL PRESSURE IN SUPPLY LINE	SEC.		5	ERS						66K8					
BNR. SERVOMOTOR LIMIT SWITCHES:															
MAX. POS.	degr.	0-130	130	SQM 10.15562						68A2 I				BURNER	
RELEASE LANCE OPERATION	degr.	0-130	70	SQM 10.15562						68A2 V				BURNER	SEE PAGE 68 IN WIRING
PART. LOAD UP	degr.	0-130	50	SQM 10.15562						68A2 VI				BURNER	DIAG. AND BUNER
PART. LOAD DOWN	degr.	0-130	50	SQM 10.15562						68A2 VII				BURNER	INSTRUCTION MANUAL
ING. LOAD DOWN	degr.	0-130	35	SQM 10.15562						68A2 III				BURNER	
ING. LOAD UP	degr.	0-130	30	SQM 10.15562						68A2 IV				BURNER	
MIN. POSITION	degr.	0-130	0	SQM 10.15562						68A2 II				BURNER	

		REV	DESCRIPTION	DATE	BY
ENGINEERING	(35113-53374-00609)	1			
FIRM	AALBORG INDUSTRIES	2			
DESIGNATION	X T1850 + T1851	3			
CUSTOMER	00-735214 + 735216	4			

SHEET	LIST OF SET POINTS		DRAWER NC
REF	*	PAGE	PROJECT MPO
DRAWING NO	01279	136	DATE 18.05.2001

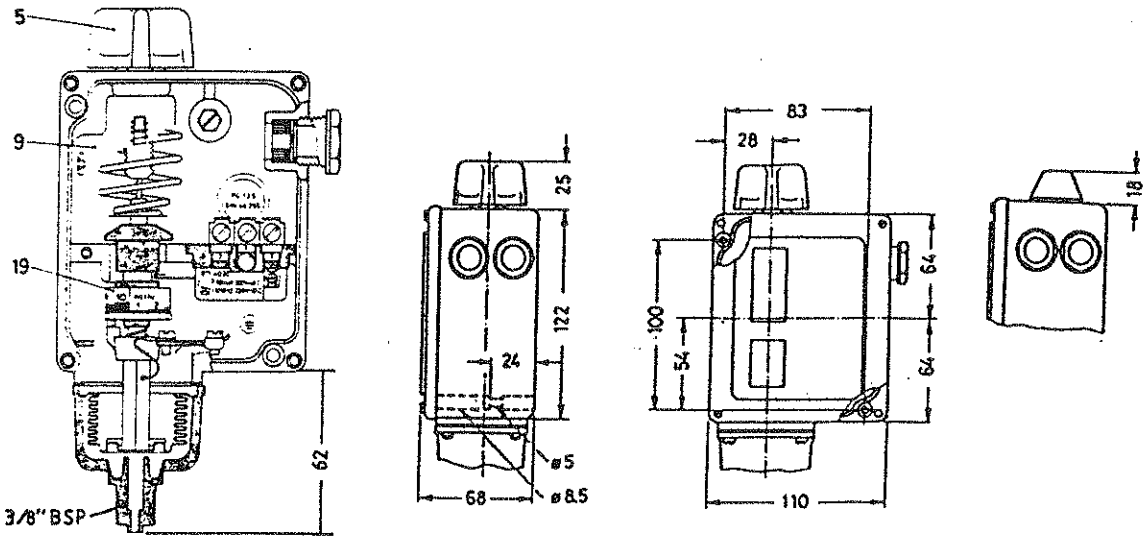


Fig. 1

Data

Pressure Controllers Types RT 5, 110, 112, 116, 117, 121, 200

Max. ambient temperature: 70°C
Max. temperature of medium: 100°C
Max. test pressure

RT 110, 112, 121:	7 bar
RT 5, 116, 200:	25 bar
RT 117:	35 bar

Min. test pressure: 76 cm Hg vacuum

Fitting

Make the pressure connection so that any foreign matter in the line does not block the pressure inlet of the control. E.g. fit the pressure control to an upward pointing connector (unit vertical).
Damp out strong pressure pulsations.

Insert a water-filled tube loop as a temperature lock (e.g. a 10 mm Cu tube) if at high plant temperatures there is a risk that the pressure connection of the control will become heated to more than 100°C.
Position the pressure control so that on water plant it cannot be exposed to frost. It can operate on an air cushion, for example.

Setting

The pressure controller is set by rotating the knob (5), at the same time reading the main scale (9). See fig. 1.
The differential is set by rotating the differential adjusting nut (19) to the value indicated by the use of the nomogram in fig. 5. The maximum operating pressure is thus the sum of the setting pressure and the differential.

The used one	Type
	RT 5
	RT 116
	RT 117
→	RT 200

Electrical connection
RT pressure controls are fitted with two Pg 13.5 screwed cable entries suitable for cable diameters from 5 to 14 mm.

Example
It is desired to control the pressure in an oilfired steam boiler by the use of an RT 116. Maximum pressure 9 bar. Minimum pressure 8.2 bar. Differential 9 − 8.2 = 0.8 bar.

1. Connect the oil burner to terminals 2-1 of the pressure controller.
2. Set the pressure controller for 8.2 bar by rotating the knob (5).
3. Set the differential adjusting nut (19) at the figure 6 which is found by reading the nomogram in fig. 5.

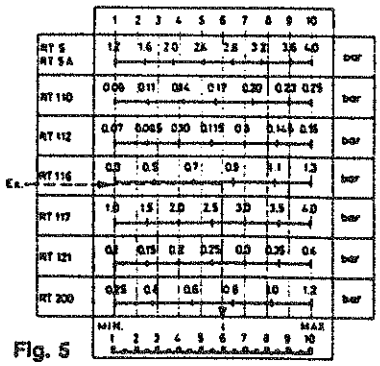


Fig. 5

Functional description

Differential pressure switch in pressure and vacuum range. The differential pressure acts via the diaphragm against the force of the setting spring on the microswitch. The pressure switch operates without auxiliary power.

LGW...A2 differential pressure switch

The control unit responds to differential pressure. If the set reference value (mbar) is exceeded or undershot, the circuit is switched on, off or over.

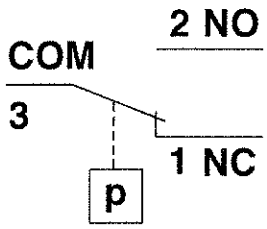
LGW...A2P test button

The LGW...A2P differential pressure switch is equipped with a test button. The test button permits a service-friendly check of the safety function.

If the test key is pressed while the pressure exists, the connection to the pressure connection **G 1/4** is interrupted and the pressure under the diaphragm is released. The microswitch of the pressure switch changes the contact position from NO to NC. If the test button is released, the pressure below the diaphragms is built up again and the microswitch changes to its original position.

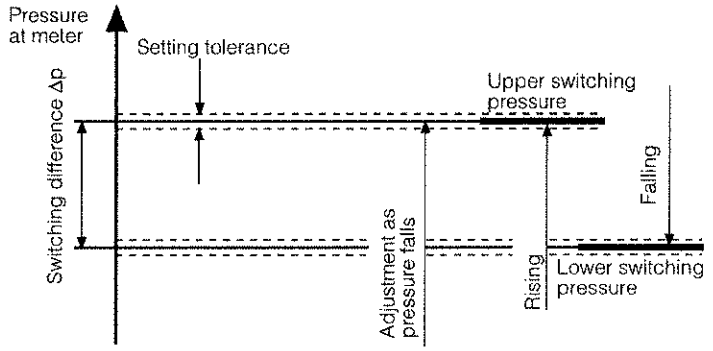
LGW...A2, LGW...A2P switching function

As pressure rises:
1 NC opens, 2 NO closes
As pressure falls:
1 NC closes, 2 NO opens



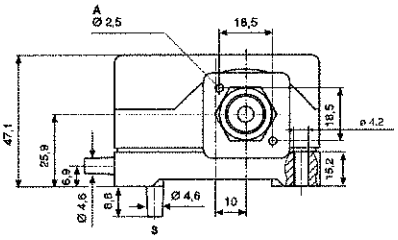
Definition of switching difference Δp

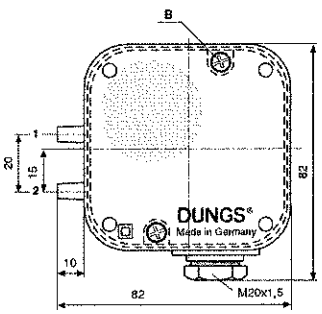
The switching difference Δp is the pressure difference between the upper and lower switching pressures.



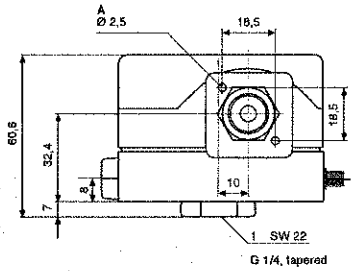
Dimensions [mm] LGW...A2

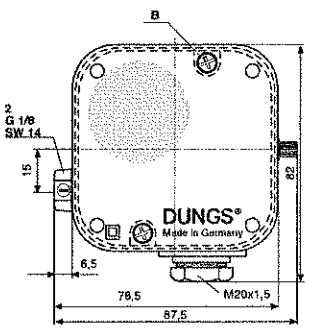
A 2.5 dia for equipment plug as per DIN EN 175 301-803
B Oblong slot: 0.8 and cross-head as per DIN 7962-Z 2
1 Pressure connection (+)
2 Pressure connection (-)
3 Only LGW... A2 optional pressure connection (+)
4 Test button p (+)

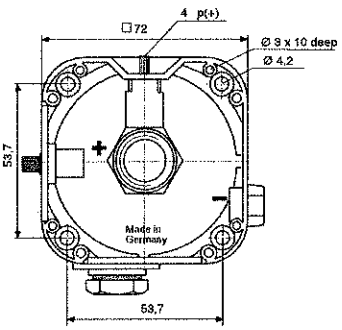


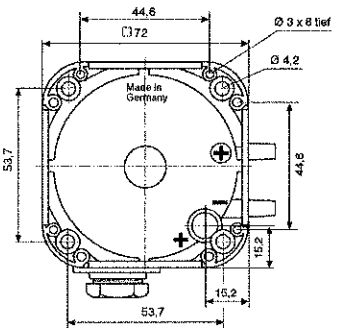


LGW...A2P









Specifications

Max. operating pressure	LGW 3 A2 - LGW 150 A2 LGW 3 A2P - LGW 150 A2P			500 mbar (50 kPa) 500 mbar (50 kPa)
Ranges	0.4 - 3 mbar 1 - 10 mbar 2.5 - 50 mbar 30 - 150 mbar			
Pressure connection	LGW A2: 4.6 mm dia. hose gland LGW A2P: G 1/4 tapered female thread for higher pressure on centre of housing underside, including test button and on the side 4.6 dia. test point; G 1/8 female thread for lower pressure			
Temperature range	Ambient temperature Medium temperature Storage temperature	-15 °C to +70 °C -15 °C to +70 °C -30 °C to +85 °C		
Materials	Housing: Switch: Diaphragms: Switching contact:	polycarbonate polycarbonate NBR standard: Ag optional: Ag gold-plated (AU); suitable for DDC applications: 24 V DC; 0.01 A		
Switching voltage	Ag contact: Au contact:	AC eff. DC DC	min. 24 V min. 24 V min. 5 V	max. 250 V max. 48 V max. 24 V
Nominal current	Ag contact: Au contact:	AC eff. DC	10 A 20 mA	
Switching current	Ag contact: Au contact:	AC eff. max. AC eff. max. AC eff. DC DC DC min. 5 mA	6 A 3 A min. 20 mA min. 20 mA max. 1 A max. 20 mA	at cos φ 1 at cos φ 0.6
Electrical connection	Standard: Special design:	At screw terminals via M20x1.5 cable entry Plug connection for line sockets as per DIN EN 175 301-803, 3-pin		
Degree of protection	IP 54 as per IEC 529 (EN 60529), protection insulated			
Adjustment	Optionally adjustment for rising or falling pressure possible on site			
Setting tolerance	±15% switching point deviation referred to reference value, adjusted as pressure rises, vertical diaphragm position			

Installation position
Standard installation position with **vertically** upright diaphragm. When installed **horizontally**, the pressure switch switches at a pressure higher by approx. 0.5 mbar
When installed **horizontally overhead**, the pressure switch switches at a pressure lower by approx. 0.5 mbar
When installed in an **intermediate installation position**, the pressure switch switches at pressure deviating from the set reference value by max. ± 0.5 mbar.

Differential pressure switch for air, flue and exhaust gases

LGW...A2, LGW...A2P

DUNGS®

Technical data 1mbar = 100 Pa = 0.1 kPa ≈ 10 mm WS 1 Pa = 0.01 mbar ≈ 0.1 mm WS

Type	Version [Ag-M-V9]	Order No.	Setting range [mbar]	Switching difference Δp [mbar]
LGW A2 Differential pressure switch	LGW 3 A2	107 409	0.4 - 3	≤ 0.3
	LGW 10 A2	107 417	1 - 10	≤ 0.5
	LGW 50 A2	107 425	2.5 - 50	≤ 1
	LGW 150 A2	107 433	30 - 150	≤ 3
	LGW 3 A2P	120 204	0.4 - 3	≤ 0.3
	LGW 10 A2P	120 212	1 - 10	≤ 0.5
	LGW 50 A2P	221 207	2.5 - 50	≤ 1
	LGW 150 A2P	120 238	30 - 150	≤ 3

Accessories for LGW...A2, LGW...A2P pressure switches

Kit: G3 equipment plug, 3-pin without ground	231 770
Line socket, 3-pin + E, grey GDMW	210 318
KlimaSet accessories KS A2	214 828
G 1/8 screw-in gland	230 278
G 1/4 screw-in gland	230 279
Additional test button, complete PT 4	224 940
Attachment plate	230 301
Mounting kit glow lamp 230 V yellow	231 773
Mounting kit glow lamp 120 V yellow	231 772
Mounting kit display-LED 24 V yellow	231 774
Mounting kit glow lamp 230 V green	248 239
Mounting kit display-LED 24 V green	248 240

We reserve the right to make any changes in the interest of technical progress.

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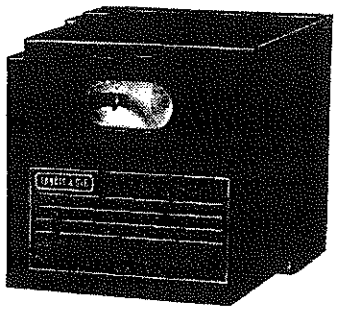
FM739

Burner Controls for continuously operating Burners

(with self-checking flame signal amplifier)

LOK16... LGK16...

Series A



Supplementary data sheets 7712 and 7713

Burner controls for continuously operating multi-stage or modulating burners of medium to high capacity; with air pressure supervision for checked air damper control.
The gas burner controls are tested to EN298 and CE certified in compliance with the directives for gas-fired appliances and electromagnetic compatibility.
The oil burner controls are tested to EN230 and CE certified in compliance with the directives for electromagnetic compatibility.

Mechanical design

The burner controls are of plug-in design. Housing and plug-in baseplate consist of shock- and heat-resistant black plastic.

The lock-out indicator, fault signal lamp and reset button are located in the unit's viewing window. The burner control has an exchangeable unit fuse and a spare fuse.

Fitting notes

Conversion of existing plants

When converting plants to LOK16... or LGK16..., the existing LAL- or LFL-baseplate must be secured by a grooved pin, thus making certain that only one of the LOK16... or LGK16... types can be fitted.
Ordering no. for grooved pin: **4 166 8024 0**

Location of grooved pin: between terminals **10/11 of the LAL** baseplate, and between terminals **4/5 of the LFL** baseplate.

Repetition in the event of loss of flame

By removing link B on the underside of the unit, the LOK16... can be switched to start repetition in the event of loss of flame during operation. In that case, the link must be completely cut off, but it must be made certain that this is in compliance with local standards and regulations!

Use

The burner controls LOK16... and LGK16... feature a self-checking flame supervision circuit. This circuit initiates the required safety actions not only with premature or missing flame signals, but also in the case of any kind of failure on the flame detector, the detector leads or the flame signal amplifier which, **during burner operation,** might simulate a flame signal. These burner controls are therefore suited for all types of oil- or gas-fired combustion plants where the use of self-checking flame supervision systems is either mandatory or advisable:

- Continuously operation burners
- Burners with intermittent operation which, depending on heat demand, might however operate continuously for more than 24 hours, e.g. in plants using multi-boiler cascade systems
- Burners that need to comply with the German specifications TRD411 and TRD412 for steam boilers
- Burners in plants where, for specific safety reasons, supervision of the burner by a self-checking system seems advisable

The control program and terminal connections of these burner controls are **identical** to those of the LAL2... and LFL1... respectively, so that they can also be used in existing plants

- provided very good detector current values were measured in the plant supervised so far by the LFL1..., and
- provided the following flame detectors are either already installed or can subsequently be fitted

LOK16...

- Selenium photocell detector RAR...

LGK16...

- UV detector QRA5..., specifically designed for use with the LGK16...
- Ionization current detector electrode
- UV detector QRA5... together with ionization current detector electrode, e.g. for burners with pilot burner

Functions

Principle of self-checking

In contrast to conventional amplifiers, the signal delivered by the flame detector is handled dynamically and not statically. To achieve this, the flame detector signal is converted into a sequence of control pulses and then delivered to the flame relay circuit. The latter is designed such that the flame relay can be energized only when the dynamic flame signal is present. If the pulses change due to a faulty detector or faulty detector leads, the relay is de-energized and the burner control will initiate the required safety actions.

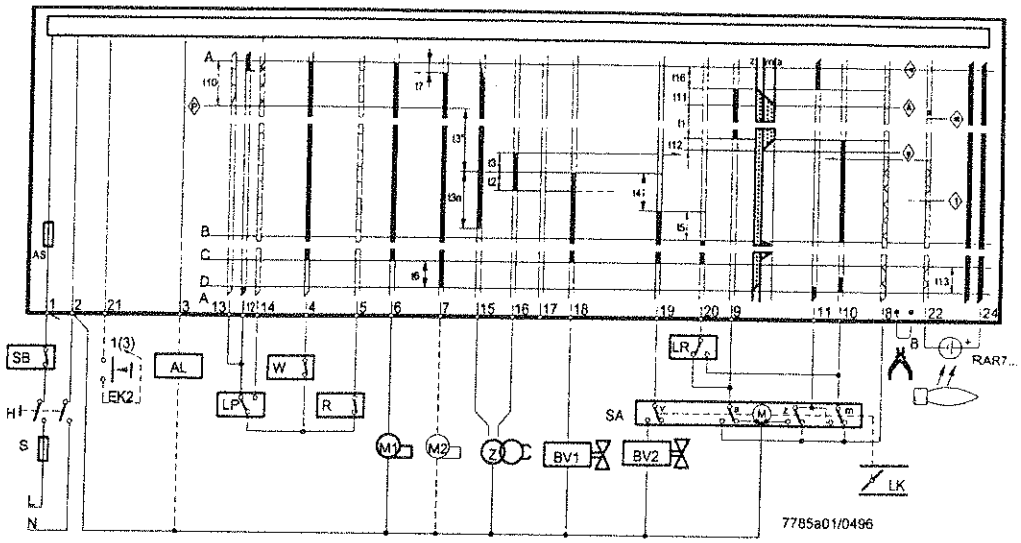
With UV supervision, it must also be made certain that self-ignition of the UV tube (e.g. due to ageing) does not simulate a flame signal. For this reason, the incident radiation at the UV cell is periodically interrupted by a shutter.

In addition to the self-checking facility, the flame signal circuit during the pre-purge time is subjected to a functional test. If it does not operate correctly, the start-up sequence is aborted or the burner goes to lock-out.

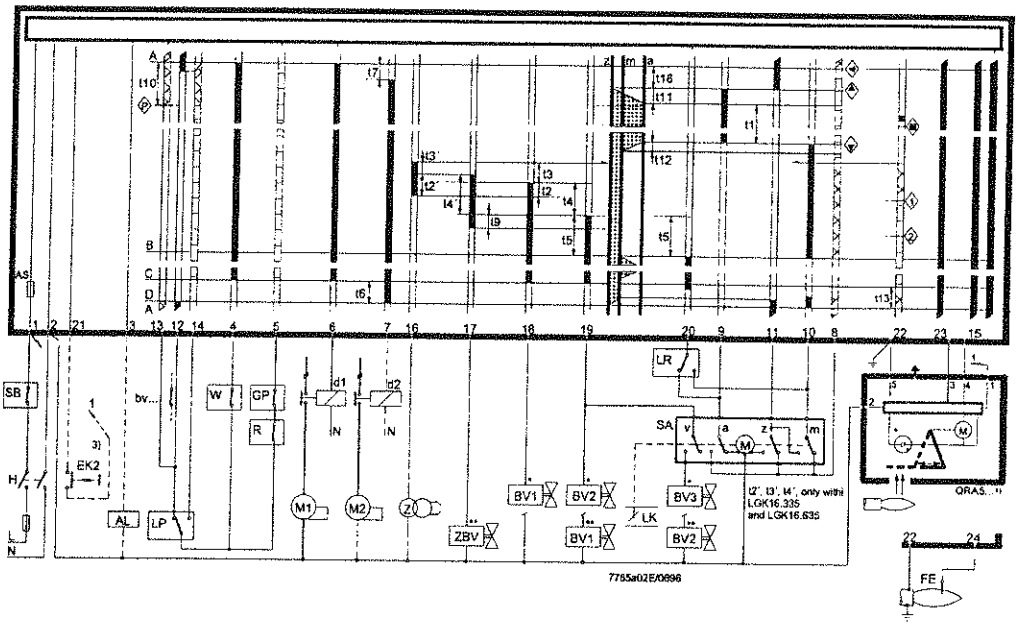
Furthermore, if the mains voltage drops to a level where the safe operation of the burner is no longer ensured, burner operation is automatically interrupted. When the mains voltage returns to the normal level, the burner control repeats the start-up sequence. However, if the detector signals are only slightly above the minimum levels, such mains voltage fluctuations may also cause the burner to go to lock-out.

Use of terminals

LOK16...



LGK16...



Legend

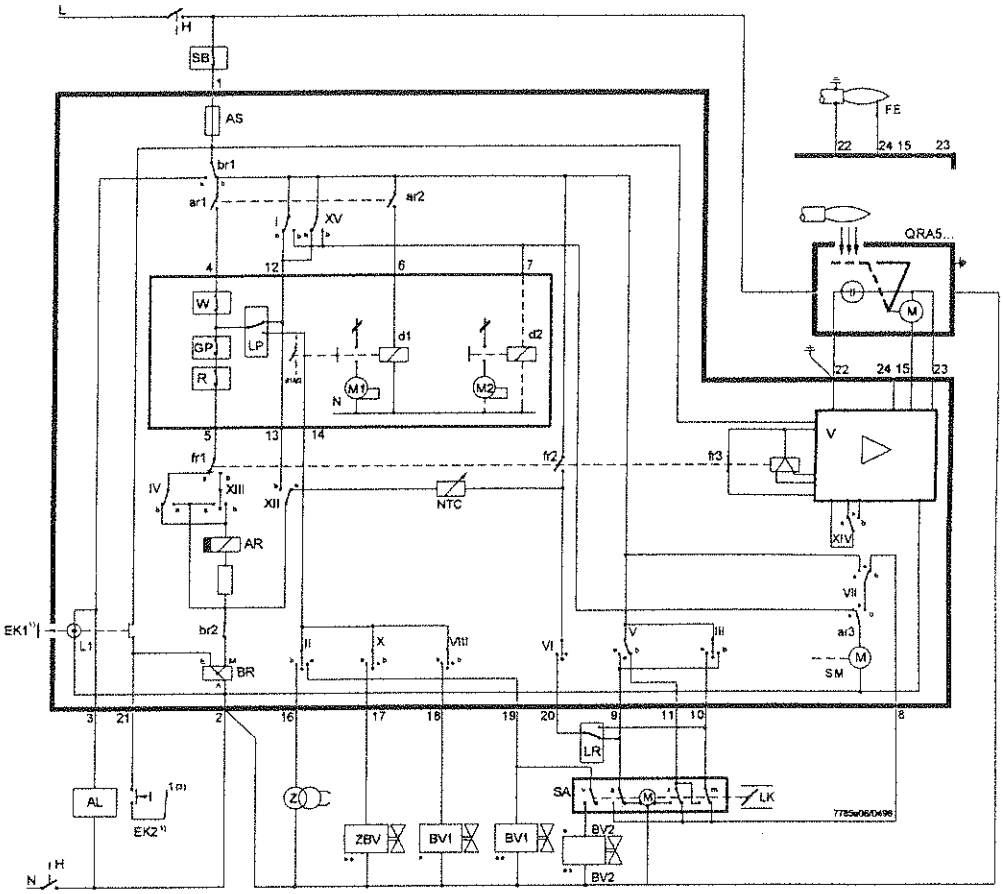
	Control signals delivered by the burner control
	Permissible input signals
7785d02D/0196	Required input signals: if these signals are not present at the points in time marked by symbols or during the shaded periods of time, the burner control interrupts the start-up sequence or initiates lock-out

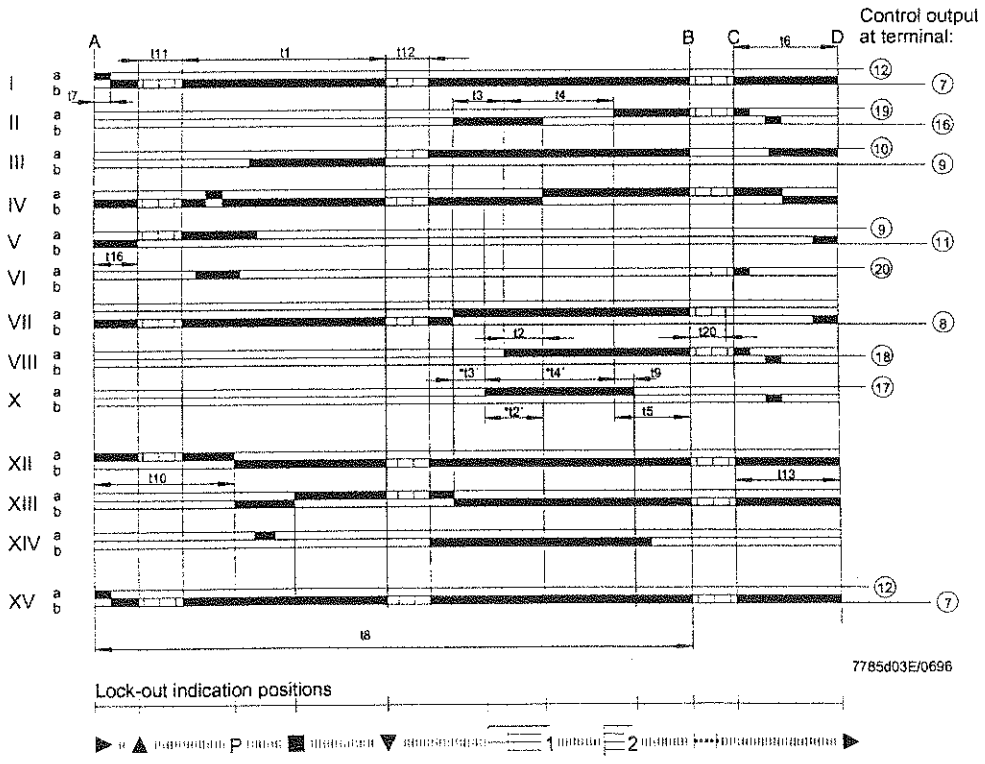
- • Valid for expanding flame burners
- •• Valid for burners with a pilot burner which is shut down after the main burner has ignited

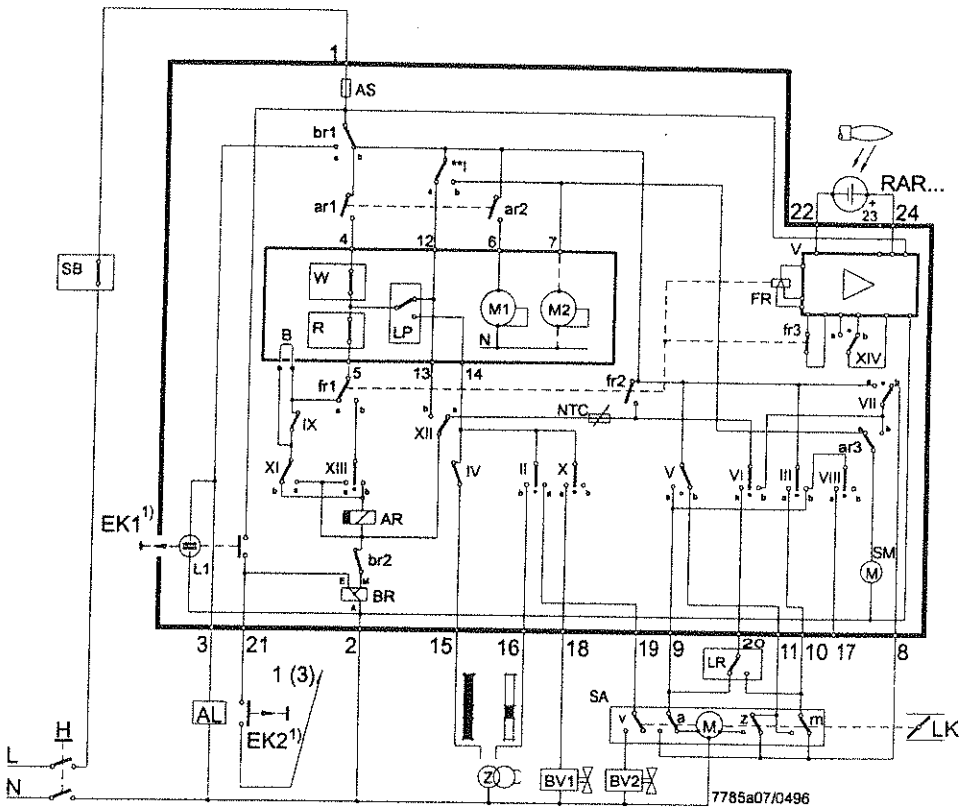
1) **When used with the QRA5..., earthing of terminal 22 is mandatory**

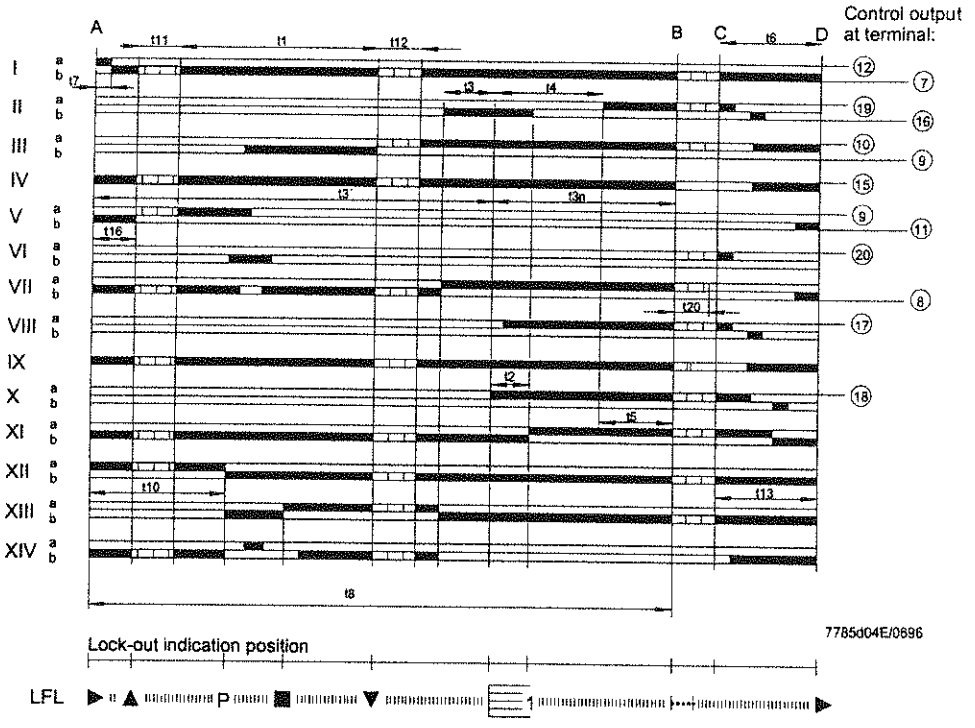
Connection diagrams

LGK16...









- • Valid for expanding flame burners
- •• Valid for interrupted pilot burners (burners with a pilot burner)
- 1) **Do not press EK for more than 10 seconds**

Legend
(for the entire data sheet)

a	Limit switch (changeover) for air damper's OPEN position
AL	Remote lock-out warning device (alarm)
AR	Main relay (load relay) with «ar» contacts
AS	Unit fuse
B	Wire link (on the burner control's baseplate)
BR	Lock-out relay with «br» contacts
BV...	Fuel valve
bv...	Auxiliary contact in the valve actuator for the CLOSED position check
d...	Contactor or relay
EK...	Lock-out reset button
FE	Ionization current detector electrode
FR	Flame relay with «fr» contacts
FS	Flame signal
GP	Gas pressure monitor
H	Mains isolator
L	Lock-out warning lamp
LK	Air damper
LP	Air pressure monitor
LR	Load controller
m	Auxiliary switch (changeover) for the air damper's MIN position
M...	Fan or burner motor
QRA...	UV detector
R	Control thermostat or pressurestat
RAR...	Selenium photocell detector
SA	Air damper actuator
SB	Safety limit thermostat
SM	Synchronous motor of sequence switch
v	In the air damper actuator: auxiliary switch (changeover) for the release of fuel in function of the air damper position
V	Flame signal amplifier
W	Limit thermostat or pressurestat
z	In the air damper actuator: limit switch for the air damper's CLOSED position
Z	Ignition transformer
ZBV	Pilot valve

A	Start-up
B	Operating position
C	Controlled shut-down
D	End of control program

Lock-out indication positions when there is no input signal (refer to «Control program in the event of faults»):

◀	No start
▲	Abortion of start-up sequence
▼	Abortion of start-up sequence
■	Lock-out (fault in the flame supervision circuit)
1	Lock-out (no flame)
2	Lock-out (no flame)
P	Lock-out (no air pressure)

Operation

Prerequisites for burner start-up

- Burner control is reset and in the start position (terminals 11 and 12 under voltage)
- Air damper is closed. Limit switch «z» for the CLOSED position must feed voltage from terminal 11 to terminal 8
- All check contacts between terminals 12 and 5 (limit thermostat, control thermostat, etc.) must be closed

A — **Start**

When «R» closes, the burner control's sequence switch starts running. At the same time, the fan motor connected to terminal 6 (only pre-purging) receives voltage and, on completion of «t7», the fan motor or flue gas fan at terminal 7 (pre- and post-purging) also receives voltage. On completion of «t16», the control command to open the air damper is given via terminal 9. During the running time of the motor, the sequence switch does not operate as terminal 8 is not under voltage during that period of time. The sequence switch starts again only after the air damper is fully open and limit switch «a» has changed over to feed voltage to terminal 8.

t1 — **Pre-purge time** with air damper fully open (nominal amount of combustion air)

Shortly after the start of the pre-purge time, the air pressure monitor «LP» must change over, thus interrupting the current path between terminal 4 and terminal 13. Otherwise, the burner control would go to lock-out (start of air pressure check). At the same time, terminal 14 must be under voltage since this current path is used to power the ignition transformer and the fuel valves.

t3´

With the LOK16..., an ignition transformer connected to terminal 15 will therefore be switched on at this moment in time (long pre-ignition). If there is no «LP», the ignition transformer receives voltage already with the start command.

On completion of the pre-purge time, the burner control via terminal 10 runs the air damper to the low-flame position, which is determined by the changeover point of auxiliary switch «m». During the positioning time, the sequence switch stops again until terminal 8 receives voltage from «m».

t5

Interval. On completion of «t5», terminal 20 receives voltage. At the same time, control outputs 9 to 11 and input 8 are galvanically separated from the unit's control section so that the latter is protected against reverse voltages from the load control circuit.

The start-up sequence of the burner control ends with the enabling of load controller «LR» at terminal 20. The sequence switch switches itself automatically off, either immediately or after some so-called idle steps, that is, without changing the contact positions - depending on the time variant used.

Expanding flame burners with LOK16... or LGK16...

t3 — **Short pre-ignition time;** then fuel release via terminal 18.

t2 — **Safety time** (part load)

Not later than at the end of the safety time, a flame signal must be present at the input of the flame signal amplifier, or else the burner control will initiate lock-out.

t3n — **Post-ignition time** (only with the LOK16..., provided the ignition transformer is connected to terminal 15).

t4 — **Interval** until the fuel valve at terminal 19 is enabled.

t3
t3´

Short pre-ignition time; then release of fuel for the pilot burner via terminal 17.

t2
t2´

1st safety time (pilot load)

No later than at the end of the safety time, a flame signal must be present at the input of the flame signal amplifier, or else the burner control will initiate lock-out.

t4
t4´

Interval until the fuel valve at terminal 19 is enabled (start load of the main burner).

Times t2´, t3´ and t4´ are only programmed by burner controls type LGK16.335 and LGK16.635.

t9

2nd safety time. On completion of the safety time, the main burner must have been ignited by the pilot burner since the pilot gas valve will be closed on completion of «t9».

B

Operating position of burner

B-C

Burner operation (generation of heat)

During burner operation, the load controller runs the air damper to the nominal load or low-flame position, depending on heat demand. Here, the nominal load is enabled by auxiliary switch «v» in the air damper actuator.

C

Controlled shut-down by «R»

In the case of a controlled shut-down, the fuel valves will immediately be closed and, at the same time, the sequence switch starts again and programs the

t6

Post-purge time (post-purging with fan M2 connected to terminal 7).

Shortly after the start of the post-purge time, voltage at terminal 10 is reinstated so that the air damper will travel to the MIN position.
The full closing of the air damper commences only shortly before completion of the post-purge time, initiated by the control signal on terminal 11, which also remains under voltage during the following burner off period.

D-A

End of control program (= start position)

When, on completion of «t6», the sequence switch has reset the control contacts to their start positions, thereby switching itself off, the detector and flame simulation test is started again. However, during the burner off period, lock-out can occur only if the faulty flame signal lasts a few seconds. Hence, short ignition pulses of the UV detector caused by cosmic radiation do not initiate lock-out.

Control program under fault conditions

In the event of fault conditions, the supply of fuel is always interrupted and, at the same time, the sequence switch stops and thus the lock-out indicator as well. The symbol appearing above the reading mark indicates the kind of fault:

◀ **No start,** because one of the contacts is not closed (also refer to «Prerequisites for burner start-up») or **lock-out during or after completion of the control program** due to extraneous light (e.g. flame not extinguished, leaking fuel valves, faulty flame supervision circuit, or similar).

▲ **Abortion of the start-up sequence,** because limit switch «a» has not fed the OPEN signal to terminal 8. Terminals 6, 7 and 14 and, with the LOK16..., terminal 15 also, remain under voltage until the fault is corrected.

p **Lock-out,** because the air pressure signal has not been received at the start of the air pressure check.
Any air pressure failure after this point in time also causes the burner control to initiate lock-out!

■ **Lock-out** due to a fault in the flame supervision circuit.

▼ **Abortion of the start-up sequence,** because auxiliary switch «m» has not delivered the positioning signal for the low-flame position to terminal 8. Terminals 6, 7 and 14 and, with the LOK16..., terminal 15 also, remain under voltage until the fault is corrected.

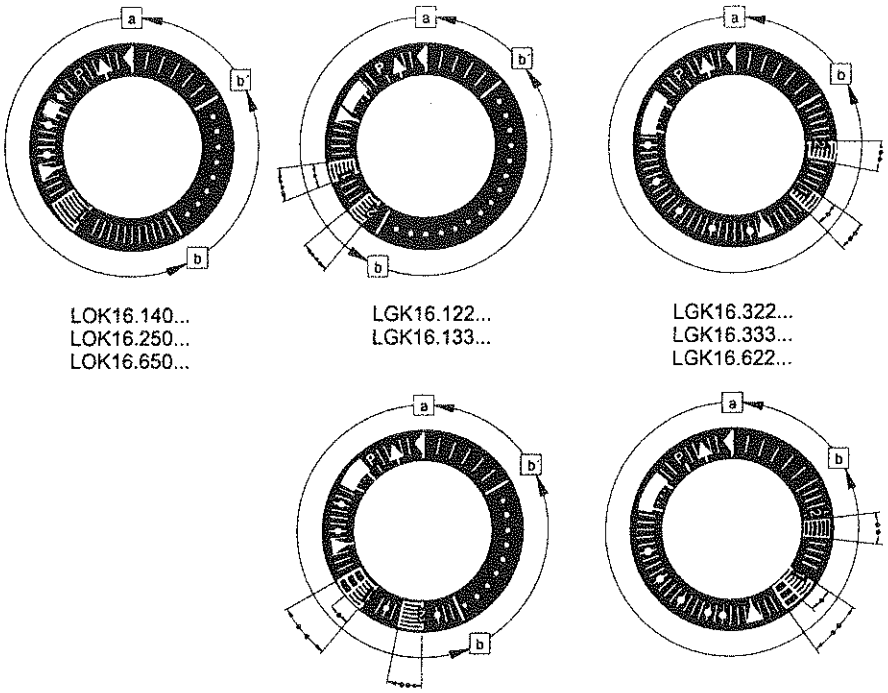
1 **Lock-out,** because no flame signal has been received on completion of the (1st) safety time.
Only with the LGK16...:

2 **Lock-out,** because no flame signal has been received on completion of the 2nd safety time (flame signal of the main flame with interrupted pilot burners).

| **Lockout *),** because the flame signal has been lost during burner operation or air pressure failure has occurred.

***) LOK16...**
If link «B» has been cut off and the flame is lost during burner operation, the burner control programs a repetition of the start-up sequence with the full program.

Lock-out indication



LOK16.140...
LOK16.250...
LOK16.650...

LGK16.122...
LGK16.133...

LGK16.322...
LGK16.333...
LGK16.622...

7785p02/0296

LGK16.335...

LGK16.635...

a-b Start-up sequence

b-b´ With some time variants: idle steps of the sequence switch up to the self-shut-down after burner start-up (b´ = running position of the sequence switch)

b(b´)-a Post-purge sequence after the controlled shut-down. In start position «a», the sequence switch switches itself automatically off or immediately initiates another burner start-up (e.g. after a fault has been corrected).

• Duration of safety time with expanding flame burners

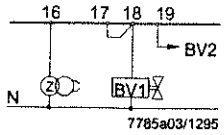
•• Duration of safety times with interrupted pilot burners

When lock-out has occurred, the burner control can immediately be reset. After resetting, and also after correction of a fault which resulted in a shut-down, or after a mains failure, the sequence switch always runs to its start position, whereby **only** terminals 7, 9, 10 and 11 receive voltage in accordance with the control program. It is only then that the burner control programs a fresh burner start.

Note: press reset button for no more than 10 seconds.

Connection examples

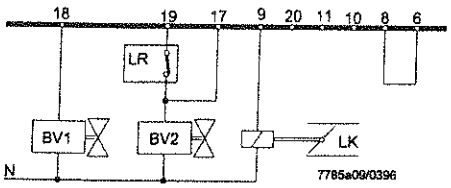
LGK16...



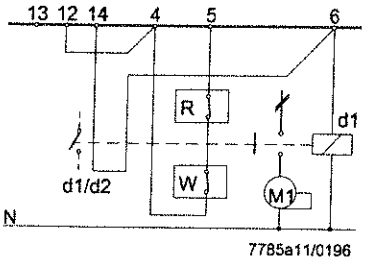
Doubling of safety time with expanding flame burners

when using burner control type LGK16.335 or LGK16.635.
By connecting terminals 17 and 18, the safety time is doubled and the pre-ignition time is reduced by 50 %. **Before using this circuit, it must be made certain that the longer safety time is in compliance with national standards and regulations!**

LOK16...



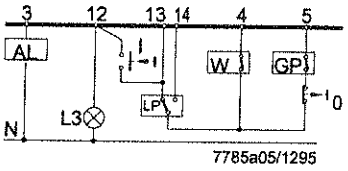
Control of air damper actuator during operation by feeding control signals to terminal 17



Wiring required for operation without air pressure supervision

If an auxiliary contact of the fan contactor is included in the circuit as shown in the diagram, ignition and fuel release are possible only when the contact is closed.

LOK16.../LGK16...

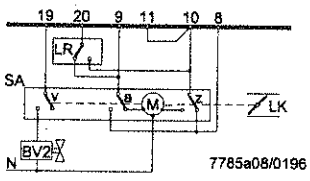


Semi-automatic start-up

The burner is switched on manually by pressing button «I». Then, the burner control programs the start-up sequence and flame supervision.

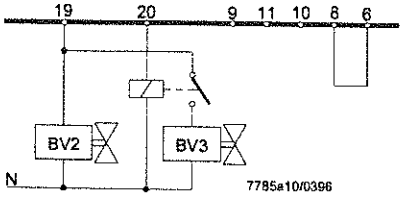
The burner is switched off manually by pressing button «0», or automatically by the limit thermostat or pressurestat «W» or the gas pressure monitor «GP». «L3» indicates when the burner control is ready to be started; it goes off shortly after the burner is switched on.

For the other connections, refer to the connection diagrams.



Connection of air damper actuators without a limit switch for the CLOSED position

«Z» is set to low-flame



Control of a fuel valve by terminal 20 in the case of burners without air damper or with an air damper not controlled by the burner control
The relay is not required if the valve connected to terminal 20 is **hydraulically series-connected** to a valve controlled by terminal 18 or 19.
If no air damper actuator is used, terminal 8 must be connected to terminal 6.

Technical data

LOK16... and LGK16...

Mains voltage	AC 230 V ±15 % or AC 100 V -15 %...AC 110 V +10 %
Mains frequency	50 Hz -6 %...60 Hz +6 %
Power consumption	3.5 VA
Pre-fuse (external)	16 A max., slow
Unit fuse	T6,3H250V to IEC 127
Perm. input current at terminal 1	5 A, to VDE 0660 AC3
Perm. loading on control terminals	4 A, to VDE 0660 AC3
Required switching capacity of switching devices connected to	
– terminals 4 and 5, and 4 and 12	1 A, DC 250 V
– terminals 4 and 14	depending on loading of terminals 15, 16, 18, 19 (LGK: 16...19), min. 1A, DC 250 V
Radio interference protection	N (to VDE 0875)
Mounting position	optional
Degree of protection	IP40
Perm. ambient temperature	
– Storage	-50 °C
Relative humidity, climatic conditions and operating temperature	to IEC 721-2-1, widespread and extremely warm and dry, non-condensing
Weight	
– Burner control	approx. 1000 g
– Baseplate	approx. 165 g

Flame supervision

	RAR... (LOK16...)	**QRA5x.C...** (LGK16...)	**QRA5x.D...** (LGK16...)	**IONIS:** (LGK16...)
Operating voltage (terminal 23 or 24)	< 1 V- ±10 %	280 V[1] ±10 %	280 V[1] ±10 %	245 V[1]
Min. detector current required	6 µA	35 µA[2]	120 µA[2]	12 µA
Max. possible detector current	25 µA	70 µA[2]	270 µA[2]	100 µA
Short-circuit current	–	–	–	approx. 300 µA
Max. length of detector leads (laid separately)	100 m	[3]	[3]	60 m[4]

[1] AC voltage, measured with no detector current at AC 230 V mains voltage. Internal resistance of measuring instrument 10 MΩ. The shutter motor of the UV detector QRA5... is powered by mains voltage

[2] Refer to specification given on the KF8832 for measuring the detector current

[3]
- Detector lead laid **in a minimum distance of 5 cm** from other mains carrying cables:
  - As a multiple cable **50 m max.**
  - With five single wires **70 m max.**
- With shielded three-wire control cable connected to terminals 3, 4 and 5 of the UV detector QRA5... and normal mains cable connected to terminals 1 and 2: **15 m max.**
- With two shielded single-wire coaxial cables (≤ 45 pF/m, e.g. RG62) connected to terminals 3 and 5 of the UV detector QRA5... and normal mains cable connected to terminals 1, 2 and 5: **60 m max.**
- If possible, the shielding should be earthed at both ends of the cable!

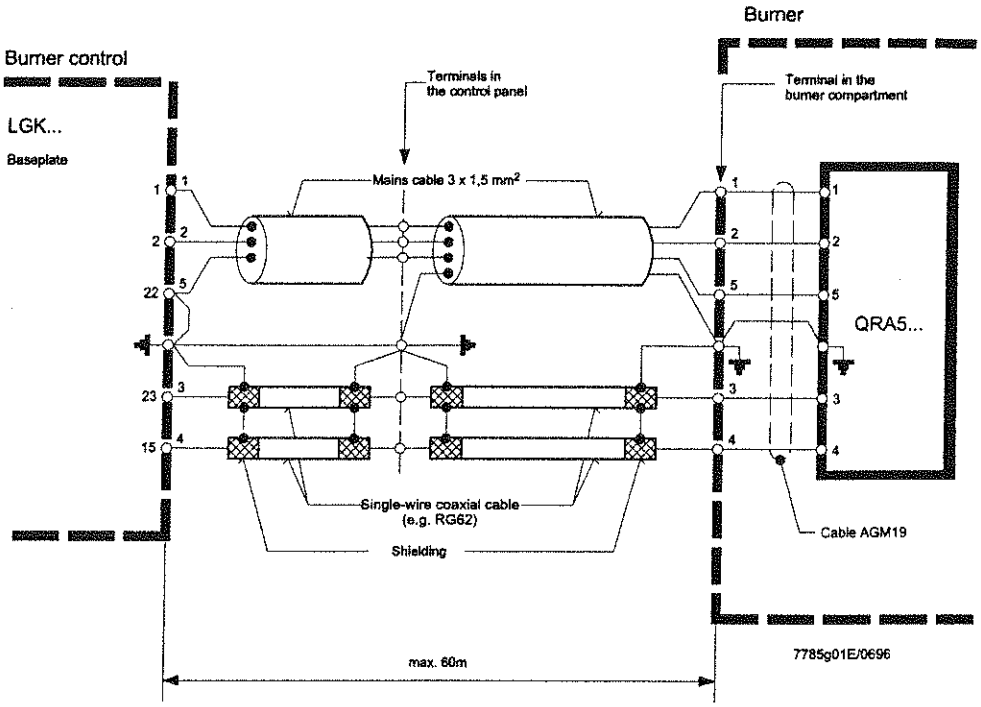
[4] Longer cable lengths are possible when connecting low capacitance detector leads to terminal 24 of the burner control (especially against earth wires)

Measuring the detector current

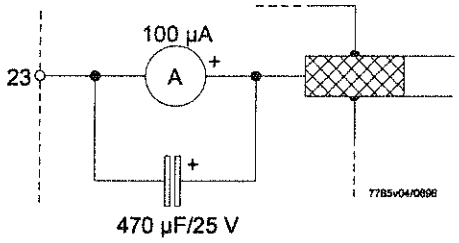
LOK16.../RAR... — The measuring instrument must be connected between the detector and terminal 22 (+pole to terminal 22).

LGK16.../QRA5... — Use the **KF8832** measuring instrument (not suited for continuous operation!). There is **no** self-checking while measurements are made. For **QRA5x.D...**, the measure unit **KF8832** is not necessary.

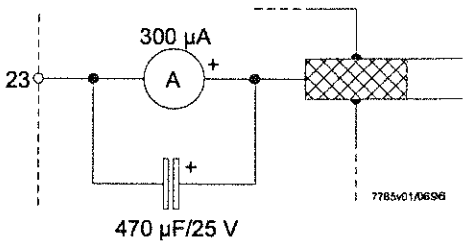
LGK16.../FE — The measuring instrument must be connected between terminal 24 and the detector electrode (+pole to terminal 24).



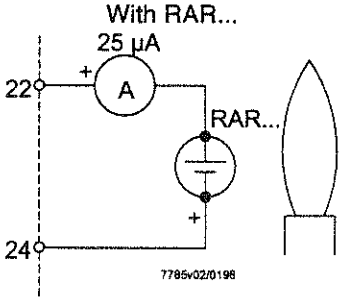
With QRA5x.C...



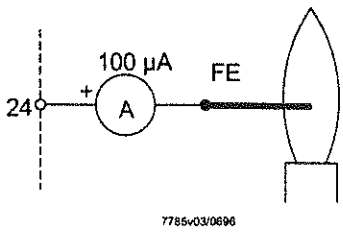
With QRA5x.D...



With RAR...

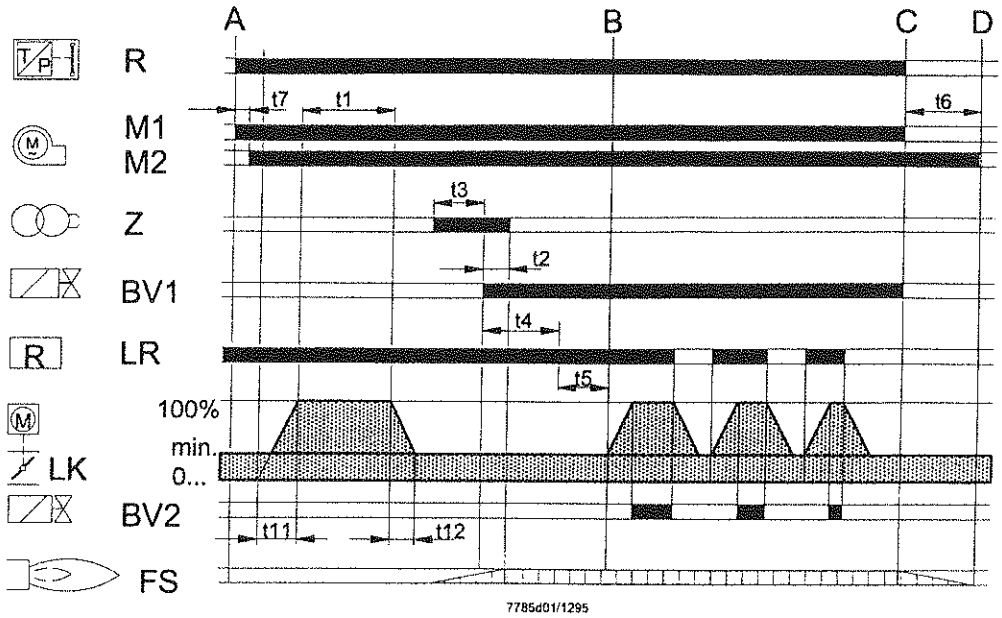


With ionization

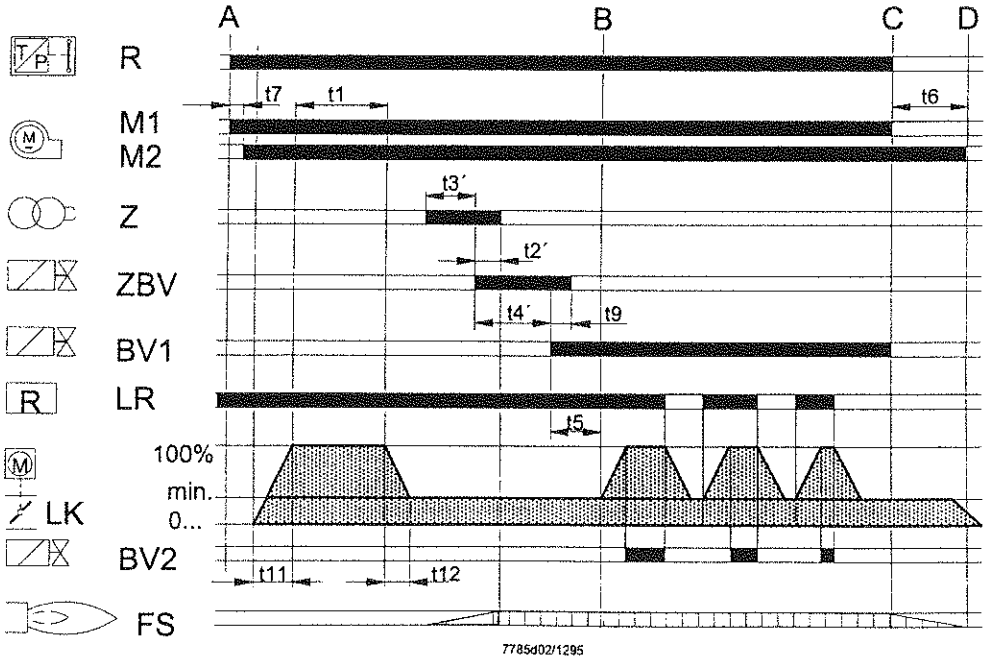


Sequence diagrams

Expanding flame burners (burners without a pilot burner), controlled and supervised by LOK16... or LGK16...
Air damper in low-flame position during burner off times(min.).



Interrupted pilot burners (burners with a pilot burner), controlled and supervised by LGK16.335 or LGK16.635, for example. The other types of burner controls of the LGK16... range program the times «t2», «t3», «t4» and «t9» for the pilot burner.



Legend
(for the times)

t1	**Pre-purge time** with air damper fully open
t2	**Safety time**, or 1st safety time with burners using a pilot burner
t2´	**Safety time**, or 1st safety time with burners using a pilot burner
t3	**Pre-ignition time**
t3´	**Pre-ignition time**
t3n	**Post-ignition time** (ignition transformer connected to terminal 15)
t4	**Interval** from the start of «t2» or «t2'» to the enabling of the valve connected to terminal 19
t4´	**Interval** from the start of «t2» or «t2'» to the enabling of the valve connected to terminal 19
t5	**Interval** from the end of «t4» or «t4'» to the enabling of the load controller or valve at terminal 20
t6	**Post-purge time** (identical with the permissible after-burn time «t13»)
t7	**Switch-on delay for fan motor M2**
t8	**Duration of start-up sequence** (excluding «t11» and «t12»)
t9	**2nd safety time** with burners using a pilot burner
t10	**Interval** from the start to the beginning of the air pressure check
t11	**Running time** of air damper to the OPEN position
t12	**Running time of air damper** to the low-flame position
t16	**Interval** from the start to the OPEN command for the air damper
t20	**Interval** to the self-shut-down of the sequence switch
t13	**Permissible after-burn time**
max.	**Safety time in the event of loss of flame** during operation

Only burner controls type LGK16.335... and LGK16.635... program the times «t2´», «t3´» and «t4´».

Warning notes

- **To protect the burner control from electric overloads, both ignition and ionization electrode must be located such that arcing over of the ignition spark to the ionization electrode cannot occur.**
- **The electrical wiring must be made in compliance with national and local standards and regulations.**
- **LOK16... and LGK16... are safety devices. It is therefore not permitted to open, interfere with or modify the units!**
- **Check wiring carefully before putting the unit into operation!**
- **LOK16... or LGK16... must be completely isolated from the mains before performing any work on them!**
- **Check all safety functions when putting the unit into operation or after having replaced a fuse!**
- **Ensure protection against electric shock on the unit and on all electrical connections by appropriate mounting!**
- **Make certain that no condensation water drips on the burner control, neither in operation nor while maintenance work is carried out.**
- **Electromagnetic emissions must be checked from an application point of view!**
- **The UV detector current measuring unit KF8832 is not suited for continuous operation.**
- **Observe the notes for laying the detector leads (refer to «Technical data»).**
- **It is not permitted to connect two UV detectors QRA5... in parallel.**
- **When using the QRA5..., earthing of terminal 22 is mandatory.**
- **Supervision with detector electrode FE and UV detector QRA5... is possible, but for safety reasons, only one flame detector may be active at a time, with the exception of the 2nd safety time «t9». At the end of the 2nd safety time, one of the detectors must be inactive, however, which means that the detected flame must have extinguished, e.g. by shutting down the pilot valve via terminal 17.**

Type summary

Switching times are given in seconds, in the order of the start-up sequence, valid for a frequency of 50 Hz. At 60 Hz frequency, the times are reduced by about 20 %.

The type references are valid for burner controls operating at AC 230 V, 50...60 Hz. For burner controls operating at AC 100...110 V, 50...60 Hz, the last two digits of the type reference read *17* in place of *27*.

LOK16...

For flame supervision with a selenium photocell detector type RAR7 or RAR8 for oil burners

	Preferred use: Flash-steam generators	Universal application	Medium or heavy oil burners
	LOK16.140A27	**LOK16.250**A27*	**LOK16.650**A27
t1	10	22,5	67.5
t2	4	5	5
t2´	–	–	–
t3	2	2.5	2.5
t3´	From start command [2])		
t3n	10	15	15
t4	8	7.5	7.5
t4´	–	–	–
t5	4	7.5	7.5
t6	10	15	15
t7	2	2.5	2.5
t8	30	47.5	92.5
t9	–	–	–
t10	6	10	10
t11	Optional		
t12	Optional		
t16	4	5	5
t20	32	35	12.5
max.	1	1	1

LGK16...

For flame supervision with UV detector QRA5... or ionization current detector electrode.

	Preferred use: Flash-steam generators	Flash-steam generators	D (also WLE), F	D. A	GB	F I	B NL
	LGK16... **.122** A27	**.133** A27	**.322** A27*	**.333** A27*	**.335** A27*	**.622** A27	**.635** A27
t1	10	9	36	31.5	37.5	66	67.5
t2	2	3	2	3	2.5	2	2.5
t2´	–	–	–	–	5	–	5
t3	4	3	4	6	5	4	5
t3´	–		–	–	2.5	–	2.5
t3n	–	–	–	–	–	–	–
t4	6	6	10	12	12.5	10	12.5
t4´	–	–	–	–	15	–	15
t5	4	3	10	12	12.5	10	12.5
t6	10	14.5	12	18	15	12	15
t7	2	3	2	3	2.5	2	2.5
t8	30	29	66	72	75	96	105
t9	2	3	2	3	5	2	5
t10	6	6	8	12	10	8	10
t11	Optional						
t12	Optional						
t16	4	3	4	6	5	4	5
t20	32	60	–	27	22.5	–	–
max.	1	1	1	1	1	1	1

Ordering

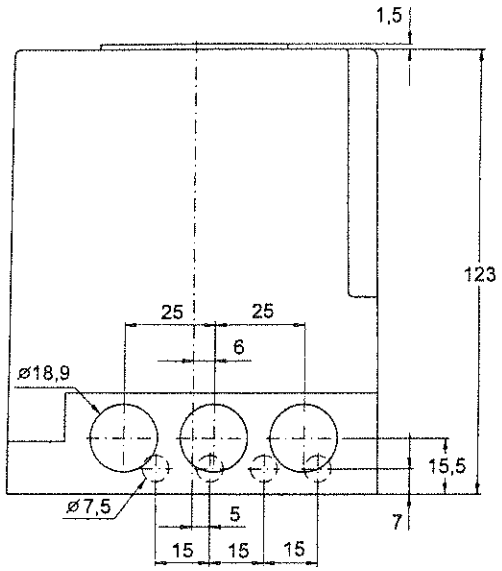
For use with oil burners	Burner control without baseplate, for AC 230 V*	Control program and connection diagram like	Preferred use for/in
	LOK16.140A27	LAL2.14	Flash-steam generators
	LOK16.250A27*	LAL2.25	Universal applications
	LOK16.650A27	LAL2.65	Heavy oil burners
Baseplate	**AGM16**	Coding of the baseplate only allows the use of **LOK16...** types	
Flame detectors	**RAR7** or **RAR8**	Selenium photocell detector (refer to data sheet 7713)	
For use with gas, oil and dual-fuel burners (depending on type of flame detector)	**LGK16.122A27**	LFL1.122	Flash-steam generators
	LGK16.133A27	LFL1.133	Flash-steam generators
	LGK16.322A27*	LFL1.322	D (WLE), F
	LGK16.333A27*	LFL1.333	D, A
	LGK16.335A27*	LFL1.335	GB
	LGK16.622A27	LFL1.622	I, F
	LGK16.635A27	LFL1.635	B, NL
Baseplate	**AGM17**	Coding of the baseplate only allows the use of **LGK16...** types	
	Detector electrode	Delivered by the burner manufacturer	
	Flame detector	Self-checking UV detector (refer to data sheet 7712)	
	QRA53C27*	Detector tube length 125 mm, normal sensitivity	
	QRA53D27	Detector tube length 125 mm, high sensitivity	
	QRA55C27	Detector tube length 70 mm, normal sensitivity	
	QRA55D27	Detector tube length 70 mm, high sensitivity	
	450240650	Replacement UV tube	
	AGM19	Plug with 2 m cable for QRA53 or QRA55	
	KF8832	Instrument for measuring the detector current (only for AC 220... 240 V!)	
	AGG16.C	Adapter with 1 in. threaded sleeve for mounting the detector onto a viewing tube projecting into the combustion chamber. Connection facility for cooling air.	

* Also available for AC 100...110 V; in that case, the last two digits of the type reference read ...17 in place of ...27

Dimensions

Dimensions in mm

LOK16... with baseplate AGM16
LGK16... with baseplate AGM17



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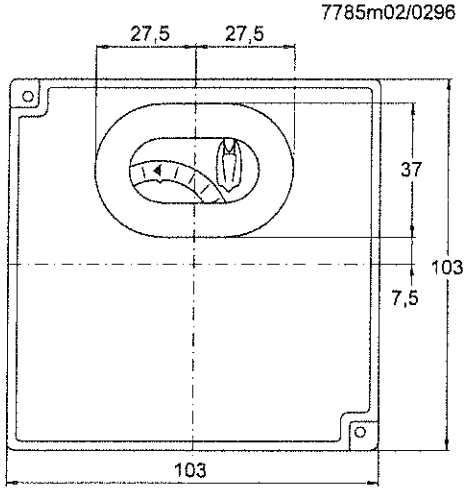
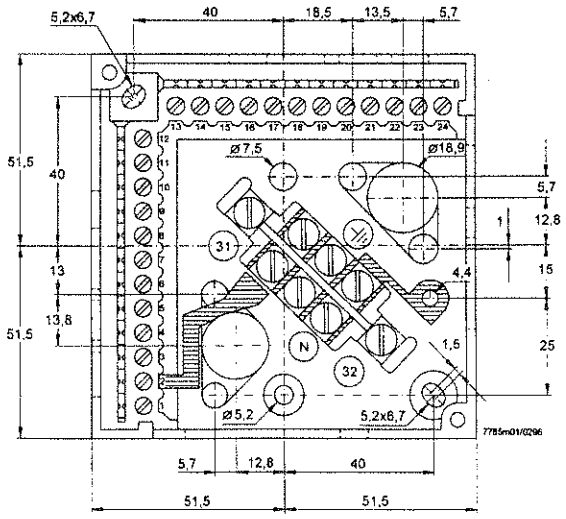


AGM16, AGM17



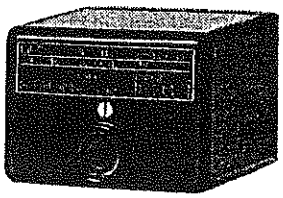
Flame Safeguard

for intermittent burners*
LAE10 for the supervision and indication of oil flames
LFE10 for gas and oil flames

LAE10
LFE10
Series 02

FM739/1

Supplementary Data Sheets 7712 and 7713



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Applications

The flame safeguards **type LAE10**, series 02, are designed for the supervision of oil flames only. The selenium photocell detectors RAR... serve as flame detectors.

The **LFE10**, series 02, can be used for the supervision of gas flames and of luminous or blue-burning oil flames. Supervision is achieved by using either an UV-detector QRA..., or an ionisation electrode. Supervision of the ignition spark according to French standards is possible, either with the UV-detector QRA..., or the ignition spark detector QRE1, series 02.

Both types of flame safeguards are used primarily in conjunction with burner control type LEC1 for the following applications:

- **Dual-supervision of burners** (supervision of the main flame or of the pilot and main flame by means of two identical or different flame detectors).
- **Supervision of burners** (supervision of the flame with different oil/gas forced draught burner detectors according to the selected fuel).
- **Multi-flame supervision** (in installations with several burners, the flames of which must be supervised individually by one or more detectors; the start-up and supervision programme, however, should or has to be carried out centrally and simultaneously by one circuit breaker only).
- The flame safeguards can also be used in conjunction with other types of burner controls, providing the given combination and selected circuitry do not impair the safety functions of the burner control.
- The design of the flame safeguards also allows them to be used as **flame indicator** units in manually operated burner plants.

Both units comply with the relevant European standards for oil and gas forced draught burners.

Construction of the Flame Safeguards

The flame safeguards are of plug-in design and comprise a power pack, the flame signal amplifier, the flame relay, an auxiliary relay to operate the UV-detector test (LFE10) or the flame simulation test (LAE10) and the flame-present indicator lamp visible through a transparent window in the unit cover. The circuitry is intrinsically safe within the terms of the relevant regulations and - when used with the burner control LEC1 - is tested in respect to funcionality each time the burner is started.

The flame safeguards may be mounted in any position directly on the burner, on a control panel or in a control cabinet. Two types of plug-in base plates designed for cable entry from the front, the sides and below are available. 2 earth terminals provide looping facilities for the earth connections of other burner components, e.g. ignition transformer, etc. (the flame safeguards are double insulated!). The base plates and the unit cover are manufactured in impact proof and heat resistant plastic. See page 4 for illustrations of the base plates and further notes.

Special Features

- Small dimensions
- Mounting position optional
- Built-in signal lamp for «flame-present» indication
- **With LAE10:** Automatic light simulation test by increasing the response sensitivity of the flame signal amplifier during the off and purge periods; programmed by LEC1 burner control.
- **With LFE10:** Automatic testing of the UV-detector by increasing the operating voltage of the UV-tube during the off and purge periods; programmed by LEC1 burner control.

Flame Detectors and Ignition Spark Detectors

- **UV-detector QRA...**
  refer to data sheet 7712
- **Photocell detectors RAR7 and RAR8**
  refer to data sheet 7713
- **Flame rectification detector**

Flame supervision by using the electrical conductivity of the flame, in conjunction with an rectifying effect, is only possible with gas and blue-flame burners. As the flame signal amplifier reacts exclusively to the d.c. component of the flame signal (ionisation current), a short-circuit between the detector electrodes cannot simulate a flame signal.

- **Ignition spark detector QRE1, series 02**

The QRE1 - slipped on one of the ignition cables - is used for ignition spark supervision when the flame supervision itself is achieved by means of a flame rectification detector. As the QRE1 reacts exclusively to the high frequency waves of the ignition circuit (100 kHz and more), a short-circuit of the ignition electrodes cannot cause a flame signal at the amplifier input. Construction: Black plastic housing with connection cable; the electronic components are encapsulated in dust and oil proof material.

* Due to safety-related reasons (self-test of the flame supervision circuit, etc.) at least one controlled shutdown has to be guaranteed in 24h. Flame supervision system for continuous operation. See data sheet 7785.

Operation and Connection Examples

Basic operation of the flame safeguards in conjunction with burner control type LEC1

With this application the flame signal generated by the flame safeguard is entered into the burner firing sequence programme at the LEC1, in order to achieve the same control and supervision function as that given by a gas or oil burner control with built-in flame safeguard.

In the event of non-ignition of the flame, the loss of flame during burner operation or a faulty flame signal during burner off and purge periods, the burner is always shut down and the LEC1 goes into lock-out position.

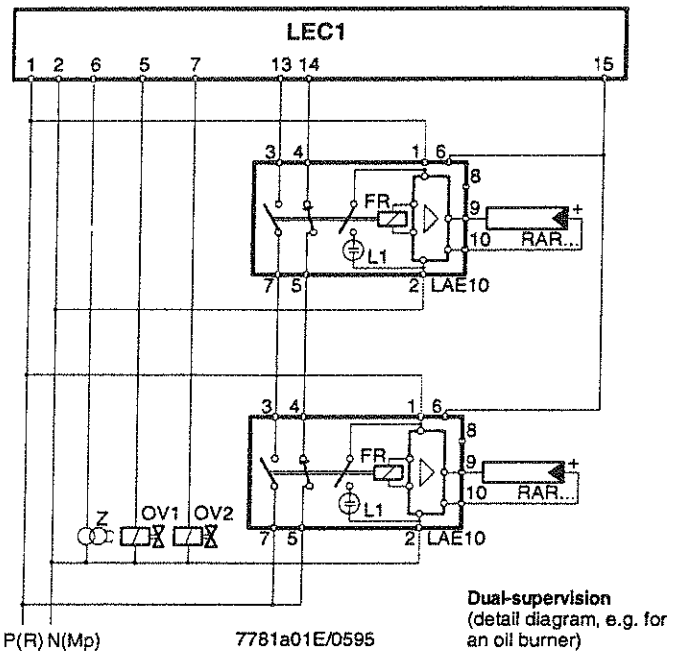
The switching functions needed to enter the flame signal to the control circuit of the burner control are provided by the flame relay FR of the flame safeguard LAE10 or LFE10 and the two auxiliary relays HR1 and HR2 in the LEC1.

Burner control LEC1 also provides the programme for the flame simulation test (in conjunction with the flame safeguard LAE10) as well as the UV-detector test (with LFE10).

The control command for the tests is given via the connection between terminal 15 of the burner control and terminal 6 of the flame safeguard in question. Both tests start about 7s after a controlled shut-down, are continued during the burner-off period and during the ensuing pre-purge time and end 3s prior to the start of the safety time. Any flame signal detected during this test time, whether caused by extraneous light, excess ageing of the UV-detector or any other defect in the flame supervision device, leads automatically to a lock-out with interlocking of the unit. In the flame safeguard the switching functions needed for the test are executed by the auxiliary relay HR3.

As it is not necessary to carry out a test in the case of flame supervision using a flame rectification detector, the connection between terminal 15 of the burner control and terminal 6 of the flame safeguard is not needed. Instead, terminal 6 should be connected directly to phase, e.g. by means of connection to terminal 1, 5 or 7 of the flame safeguard.

Any flame signal - whether normal (during operation) or faulty - is signalled by the indicator lamp in the housing of the flame safeguard.



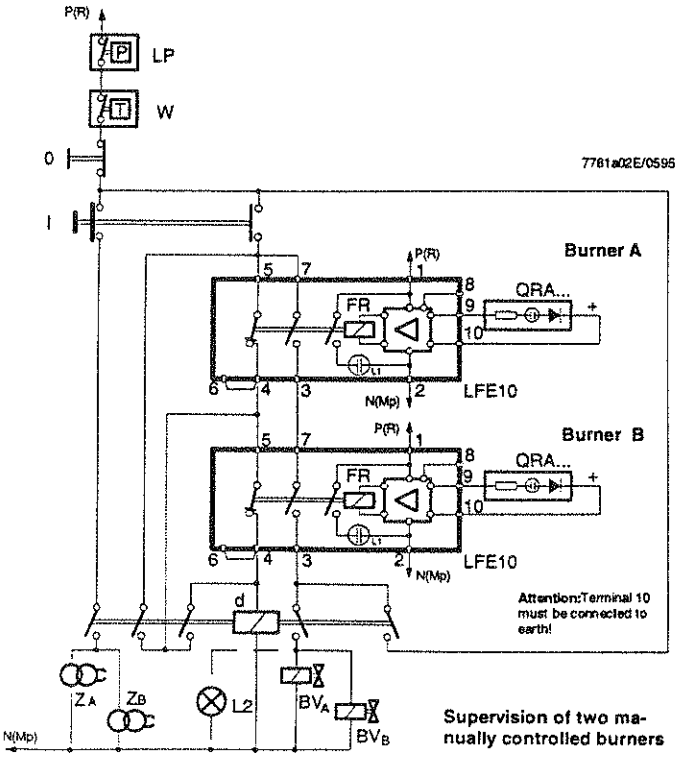
Dual-supervision
(detail diagram, e.g. for an oil burner)

Operation of the flame safeguards used for dual-supervision

With this form of supervision **one** flame is supervised by **two** independently operating flame safeguards, with the aim of reducing the possibility of a loss of flame during operation in case of a simultaneous failure of **both** flame safeguards to an "improbable coincidence".

With dual supervision the control contacts of the flame relays of both flame safeguards are connected in series, so that the loss of the flame signal **of either of the flame safeguards is sufficient** to cause the lock-out of the burner. A faulty signal by only **one** of the flame safeguards during burner off-periods or during purge times also causes a lock-out.

Attention: In case flame supervision is carried out by means of UV-detectors, it must be ensured that the two detectors are placed in such a way that there is **no direct visual contact** between them, **since an ignited UV-tube itself is a generator of UV-radiation!**



Supervision of two manually controlled burners

Operation of the flame safeguards with supervision of two manually operated burners

With this application, too, a burner start is only possible after a successful UV-detector or flame simulation test during burner-off periods, i.e. **neither** of the flame safeguards may register a flame signal. During the burner start the detector test is interrupted automatically.

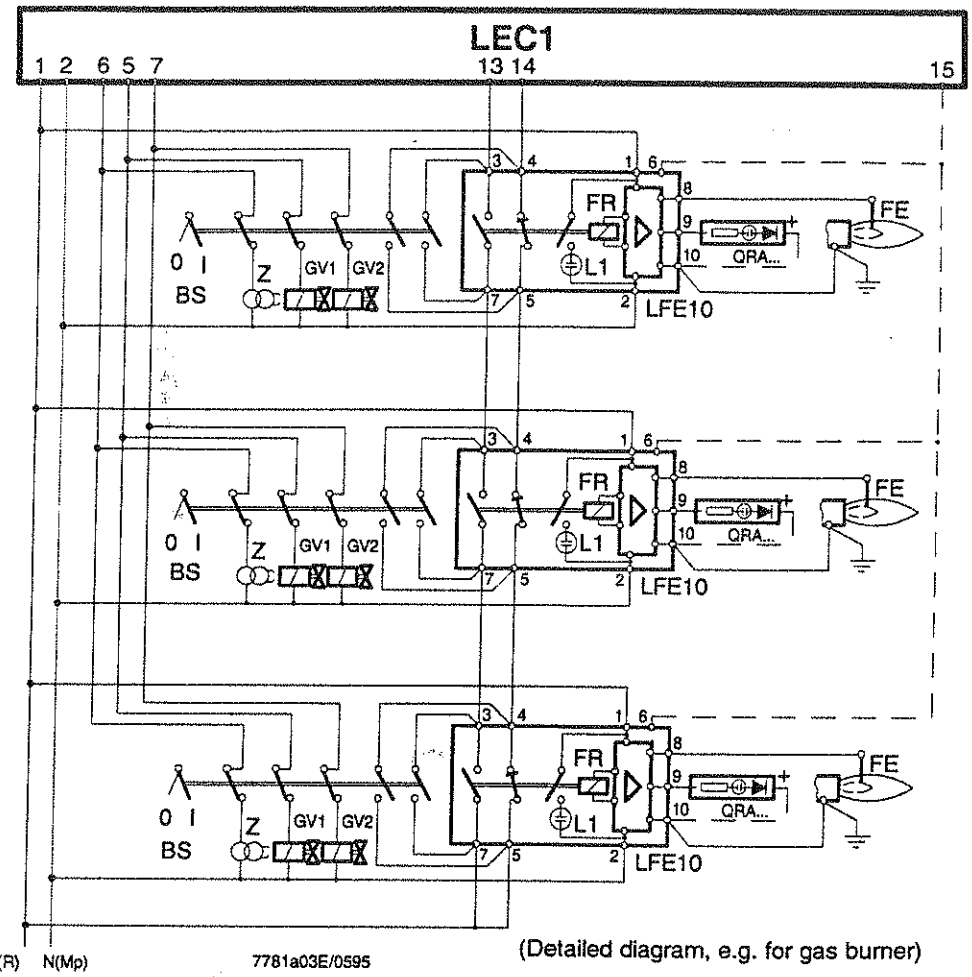
When key **I** is pressed, relay «d» is energised via the still closed current path 4-5 of the flame relays. By that the ignition for both burners is switched on and the fuel is released at the same time. The duration of the «start» pulse given by the key I should - in the sense of a **safety time** - be limited by a time relay.

Providing flame is established with **both** burners - indicated by the signal lamps in the housings of the flame safeguards -, relay «d» is maintained in its energised state via the current path 3-7 of the two flame relays. When the impulse key is released, the ignition is switched off and the start-up is completed.

In the event of loss of flame with **one** of the burners, the flame relay in question deenergises and therefore compensates the holding circuit for relay «d». This results in the immediate closure of the fuel valves of **both** burners.

The burners are switched off manually by pressing the «0» key or automatically via the thermostat or pressurestat (limiter) in the phase connection.

In the case of flame supervision using flame rectification detectors, terminal 6 of the flame safeguards should be connected directly to phase (e.g. by connection to terminal 1), as a detector test is not necessary in this case.



(Detailed diagram, e.g. for gas burner)

Legend for the basic circuit diagrams and connection examples

BS	Operating switch ON/OFF (per burner)
BV_A/BV_B	Fuel valves of the burners A and B
d	Auxiliary relay
FE	Detector electrode for flame rectification
FR	Flame relay
GV1, GV2	Gas valves for the 1st and 2nd stages
H	Mains isolator
HR3	Auxiliary relay for the UV-detector or the flame simulation test
L1	Built-in signal lamp (flame present)
L2	External signal lamp (burner running)
LP	Air pressure switch
OV1, OV2	Oil valves for the 1st and 2nd stages
W	Limit thermostat/Pressure switch
Z	Ignition transformer
Z_A, Z_B	Ignition transformers for burners A and B

Technical Data

Mains voltage	220 V~ -15% ... 240 V +10%	
	100 V~ -15% ... 110 V +10%	
Frequency	50 Hz -6% ... 60 Hz +6%	
Fuse (external)	max. 10 A, slow	
Internal Consumption	4,5 VA	
Radio interference protection	N according to VDE 0875	
Max. perm. contact loading	2 A	
Protection standard	IP40	
Permissible ambient temp.	-20...+60°C	
Mounting position	optional	
Weight without base plate	**LAE10:** 305 g	**LFE:** 395 g
With standard base plate	380 g	470 g
With special base plate	415 g	505 g

Flame supervision	**LFE10 series 02** flame rectif. detector	**LFE10 series 02** UV-detector	**LAE10 series 02** selenium photocell
Min. required detector current in µA at nominal voltage			
– at 100 V and 220 V	8	150	min. 8
– at 110 V and 240 V	9	200	min. 8
Max. possible detector current in µA at 100/110 V and at 220/240 V	approx. 100	approx. 650	approx. 25
Detectors			
Permissible cable run	20 m[1)]	20 m[1)]	20 m[2)]
Permissible ambient temp.	–	60°C	60°C

1) For longer cable run, use cable with **low capacitance**, total max. 2 nF; (e.g. single-core cable).
2) Laying of detector cable always separately and use of selenium photo cell RAR8 in case of longer distances.

Function of the flame safeguards with multi-flame supervision

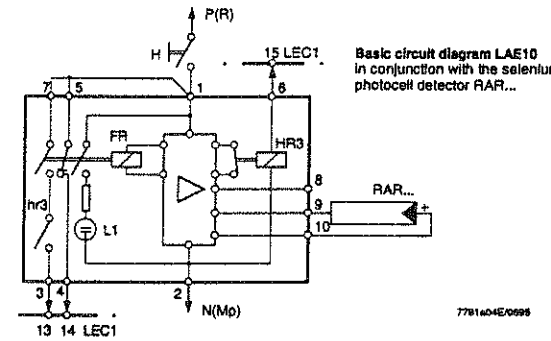
As with dual supervision, the control contacts of the flame relays of all flame safeguards must be connected in series, so that failure to establish flame during the safety time or loss of flame during operation with one of the burners causes the lock-out of all burners.

Correctly operating burners can only be restarted (after the burner control has been reset) when the faulty burner has been switched off. In this case the operating switch must not only bridge the control contacts of the flame safeguard involved (thus closing the control circuit again), but it must also interrupt the phase connection to the ignition transformer and the fuel valves.

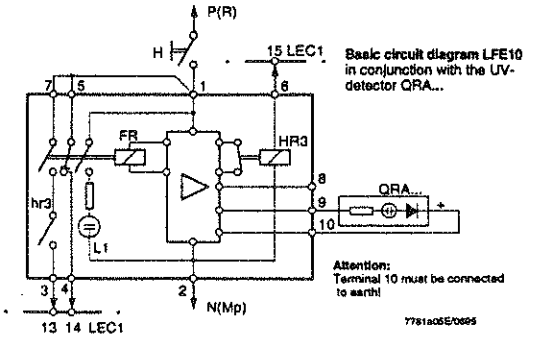
After the removal of the failure the burner can therefore only be restarted in conjunction with the other burners, i.e. only after all burners have previously been shut down.

Attention: When using the UV-detector QRA..., terminal 10 must be connected to earth!

Basic Circuit Diagrams

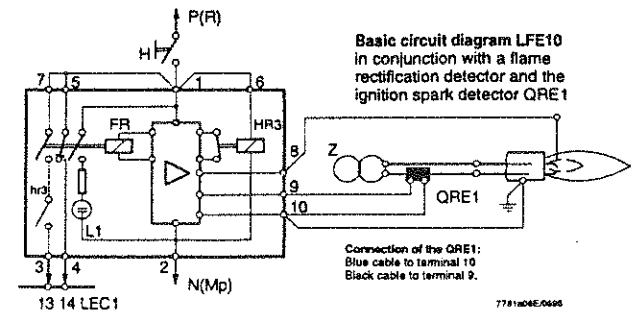


Basic circuit diagram LAE10 in conjunction with the selenium photocell detector RAR...



Basic circuit diagram LFE10 in conjunction with the UV-detector QRA...

Attention: Terminal 10 must be connected to earth!



Basic circuit diagram LFE10 in conjunction with a flame rectification detector and the ignition spark detector QRE1

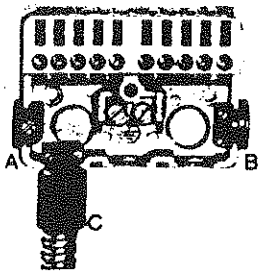
Connection of the QRE1:
Blue cable to terminal 10
Black cable to terminal 9.

Base Plate Variants

Normal base plate, AGK 4 104 1345 0

Construction: ten-pole (screw terminals), with additional earth terminals. Cable entry either via the bottom of the base plate (2 knock-out entries), via the front or via the right or left side (in total 5 cable entries).

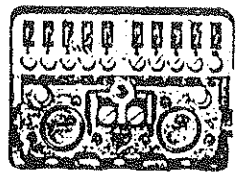
The following accessories are available for these cable entries:

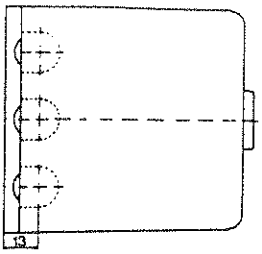


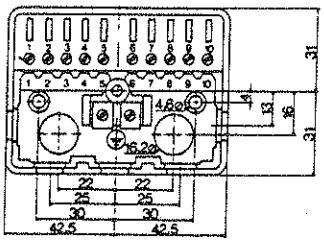
A Auxiliary terminals
no. 4 484 8916 0

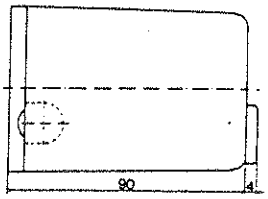
B Cable strain relief bushing for multi-core cable up to ø9,4mm
no. 4 482 1768 0

C As «B», but with threaded fitting for flexible metal pipe with 15mm external diameter
no. 4 482 1649 0









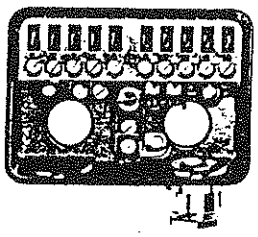
Special base plate, AGK 4 104 9025 0
with removable front (shaded area in dimension diagram)

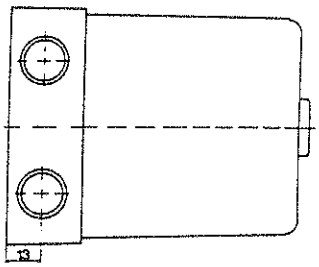
Construction: ten-pole (screw-terminals), equipped with:
- 2 auxiliary terminals with terminal numbering 11 and 12.
- 2 neutral terminals, permanently connected to neutral input, i.e. terminal 2
- 2 earth terminals with earthing lug for the burner

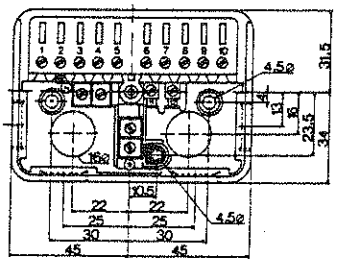
and the following cable entry facilities: 2 cable entries in the bottom of the base plate, 4 knock-out entries threaded for Pg11:
2 on the removable front and 1 at each side.

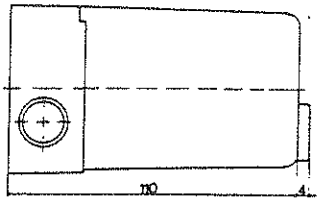
High plug-in base plate, AGK 4 104 9169 0
Features as above, but without removable front, i.e. shaded area in dimension drawing is **open**

Front, AGK 4 104 9112 0
As a single item, for use with plug-in base plate AGK 4 104 9169 0 (also suitable for the use with AGK 4 104 9025 0, shaded area in dimension drawing).



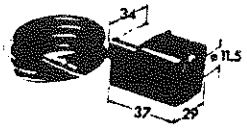






QRE1, series 02

Cable lengths:
1460 mm: QRE1.150
260 mm: QRE1.030

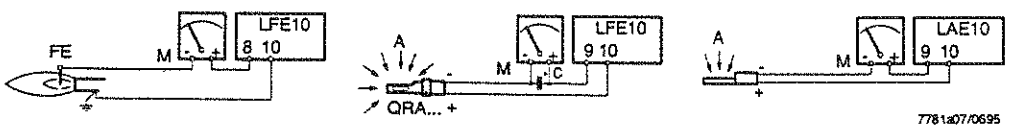


Ø of the ignition cable: max. 11 mm

Measurement Circuits

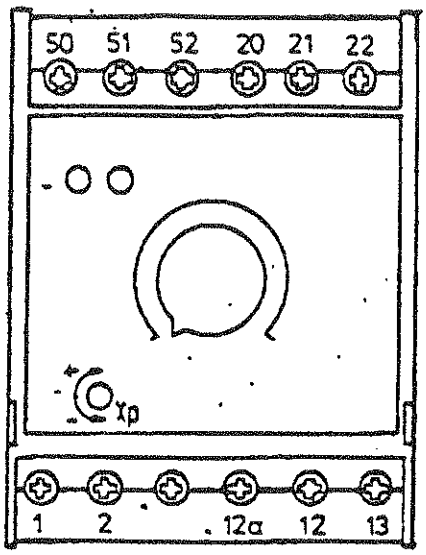
A Illumination of the flame
C Electrolytic capacitor 100 µF, 10 VDC
FE Detector electrode
M Microamperemeter

Attention: The ignition may influence the ionization current!
Possible remedy: Exchange the primary connections of the ignition transformer.

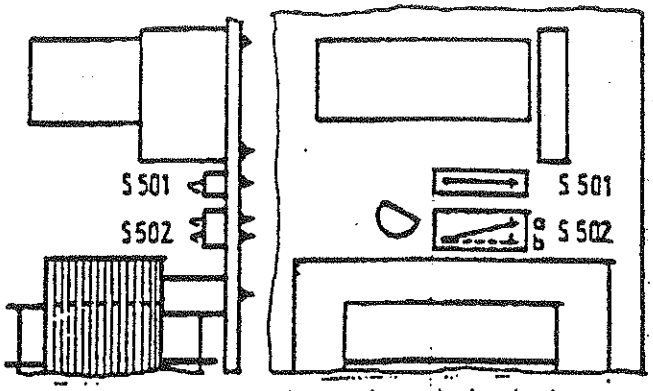


Landis & Gyr Building Control (Deutschland) GmbH, Berliner Ring 23, D-76437 RASTATT
Landis & Gyr Building Control (UK) Ltd., Hortonwood 30, TELFORD GB-SHOPSHIRE TF1 4ET
Landis & Gyr Building Control (Australia), 15 Nyadale Drive, AUS-SCORESBY, Vic. 3179
Landis & Gyr Intersystem (Japan) Corporation, 4-3-1 Tsuchihashi, Miyamaeku, Japan- KAWASAKISHI 216

CROw-54/2,re4,lk3,zv

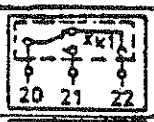
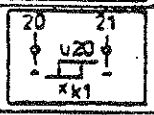
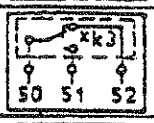


Front view
with setpoint knob



Switch over from relay output to logic control output

x_{k1}	Relay	u 20
S 501	open	closed
S 502	Position „a"	Position „b"
Xp-Poti	Left-turn stop	Right turn stop Xp-max

Connection for		Control action	Terminal	
Relay output as per label	O	$X > X_{K1}$	20 (P) common 21 (S) closing 22 (Ö) opening	
	S	$X < X_{K1}$		
Logic control output „u 20"	O	$X > X_{K1}$	20 -	
	S	$X < X_{K1}$	21 -	
Relay output limit comparator			50 (P) common 51 (S) closing 52 (Ö) opening	
Supply as per label			12 1L1 line 12a 2L1 line 13 N neutral	220 V 110 V or 240 V 
Input		Code		
Resistance thermometer		W	1 2	

Standard factory setting.

Änd.	Änderung		Werkstoff-Nr.		DIN-Kurzbezeichnung	
		95	Tag	Name	CROw-54/2,re4,lk3,zv,	
		Bearb.	30.08.		Benennung	
		Gepr.				
		Norm.			Zeichnungs-Nr.	
		Gen.			Ersatz für Nr.	
	Änderung	Tag	Name			Maßstab

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Process Controller

1 Operating, Configuring and Parameterization

This chapter contains information about operating, monitoring, configuring, parameterization and electric connection of a process controller.

The process controller is a programmable controller with digital data processing. Analog signals are fed into the process controller and compared to the adjustable setpoint in the process controller. After the data are processed, an electric signal is fed to an adjustable unit which controls a media (water, air, fuel, etc.).

A number of functions are filed in the programme memory of the controller. These functions are activated from the memory by structuring and parameterization.

The structuring or configuration of the process controller defines the instrument function and is factory set. The parameterization adjusted during commissioning defines how the process runs, displays elements, limit values, etc.

A list of settings for the specific process controller can be found in a later chapter.

1.1 Operation and Monitoring

Illustration of a Process Controller

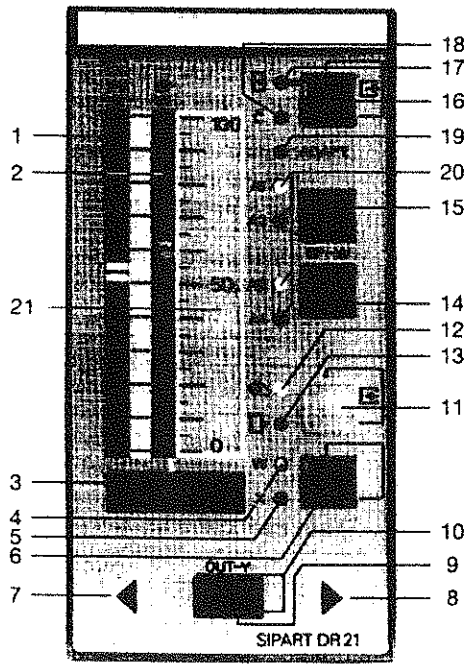


Figure 1 sipar21a.tif

The process controller is suitable for a wide range of applications. It can be used as K-controller or S-controller. K-controllers are for connection to pneumatic or hydraulic actuators with proportional gain. S-controllers can be programmed either as a three-position step controller for electric actuators or a two-step controller with two outputs for heating and cooling.

Description of Position Numbers in Figure 1		
Display actual and setpoint values		
1	Indicator	Analog indicator for actual value x (pv)
2	Indicator	Analog indicator for setpoint w
3	Indicator	w/x digital indicator. Other values can be displayed
4	LED	"w" signal lamp - lights up when w is displayed
5	LED	"x" signal lamp - lights up when x is displayed
6	Push button	Switch-over push button for w/x digital indicator. Push button to acknowledge flashing after power is restored or for accessing selection level
Modify manipulated value		
7	Push button	Button to modify manipulated value - close (open)
8	Push button	Button to modify manipulated value - open (close)
9	Indicator	y digital indicator
10	LED	Signal lamp for "dy digital outputs on S controller
11	Push button	Manual/automatic switch-over push button and "Enter" push button to move from selection level to configuring level
12	LED	Signal lamp - manual mode
13	LED	
Modify setpoint value		
14	Push button	Reduce - setpoint push button
15	Push button	Increase - setpoint push button
16	Push button	Switch-over button for "internal/external setpoint" or "Exit" button to return from configuration and selection levels to the process control level
17	LED	Signal lamp for "internal setpoint"
18	LED	Signal lamp for "computer (with $w_{ext.}$) switched off"
Other signals		
19	LED	Signal lamp for "adaptation in progress"
20	LED	Signal lamp for "limit value violated"
21	Indicator	Tagging label

Table 1

1.2 Operation in the Process Control Level

Four-Digit Green Indicator (2)

The four-digit green indicator (3) shows either the actual value x or the setpoint w. The push button (6) is used to toggle between the indicators. Other values can be displayed (configuring switches S80/S81).

Internal Setpoint w

The internal setpoint w can be changed by the push buttons (14) and (15) if w is displayed (display 3), and the controller is in internal mode (LED 17). The rate of change of the value increases the longer a button is pressed.

Manipulated Variable y

The manipulated variable y can be changed by the push buttons (7) and (8) if the controller is in manual mode (LED 12).

The change rates of the setpoint and of the manipulated variable increase the longer a button is pressed when the process controller is used as a K controller.

Internal and External Setpoint

Push button (16) is used to toggle between internal and external setpoint. LED (17) illuminates when the internal setpoint is being used.

Manual and Automatic Mode

The yellow push button (11) toggles between manual and automatic mode. The active mode is signalled by the LED (12).

Increment of S and Two-Step Controllers

The increments in all modes of the S and two-step controllers are shown by the red LEDs (10).

Violation of Limit Values

Violation of limit values is indicated by the LEDs (20).

Progress of Parameter Optimization during Adaption

LED (19) signals the progress of parameter optimization during adaption through either a steady or flashing light.

Lamp Test

If push button (6) is pressed and held for more than five seconds, all LEDs on the front of the controller are illuminated until the button is released.

1.3 Accessing the Levels

Configuration and parameterization are performed from the front panel of the process controller. The function of the front panel is first changed from the process control level to the selection level. From this level the configuration level can be selected. An illustration of the levels is shown in Figure 2. The changeover must be carried out within a specified time limit.

Illustration of Process Controller Levels

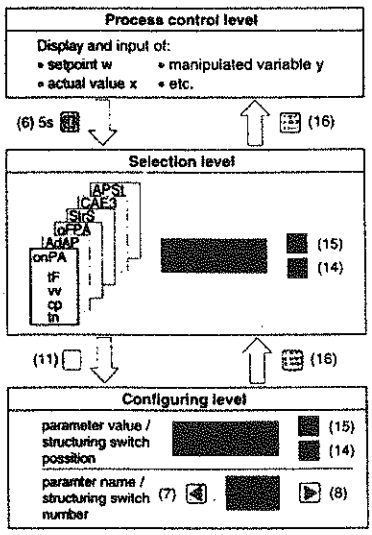


Figure 2 sipar21b.tif

1.4 Operating and Error Messages

The following operating and error messages can be displayed on the PV-X (1) digital indicator as shown in Figure 3.

List of Error Messages

oFL	Value too large / small for indicator.
. . 4 .	Analog signal monitoring, e.g. input 3 (character in 3rd digit position) tripped.
tESt	CPU monitoring following power up.
CPU4	CPU defective.
nEn4	EEPROM defective.
oP. 1 .	UNI signal conditioning module (optional) in slot 1 not installed.
oP. .3	Signal conditioning module (optional) in slot 3 not installed.

Figure 3 sipar21c.tif

1.5 On-line Parameters (onPA)

Parameters that determine how the process runs and can be modified during unrestricted controller operation (on-line). See Table 2.

1.5.1 Accessing the onPA List

- Press button (6) for about 6 sec. until "PS" flashes. Release the button, and "onPA" (selection level) is displayed. It is blocked if digital signal BLPS=1.
- Press button (11) once (configuration level).

1.5.2 Selecting and Modifying Parameters

- Use buttons (7) or (8) to select parameter names from y digital indicator (9).
- Use buttons (14) or (15) to modify the parameter value in the w/x didital indicator (3).
- Repeat these steps until all desired parameters are set.

1.5.3 Exit to Process Control Level

- Press button (16) twice (selection level and process control level).

onPA - on-line Parameters						
Parameter		Parameter Name	Min.	Max.	Factory Setting	Eng. Unit
Filter time constant for xd filter (adaptive)		tF	off / 1.000	1000	1.000	s
Derivative action gain	Vv	uu	0.100	10.00	5.000	1
Proportional gain	KpP	cP	0.100	100.0	0.100	1
Integral action time	Tn	tn	1.000	9984	9984	s
Derivative action time	Tv	tv	off/1.000	2992	off	s
Response threshold		AH	0.0	10.0	0.0	%
Working point		Y0	Auto/0.0	100.0	Auto	%
Start of manipulated. variable value		YA	-10.0	110.0	-5.0	%
Full scale of manipulated variable value (YA≤YE)		YE	-10.0	110.0	105.0	%
Heating period / y positioning time open		tP	off/0.100	1000	1.000	s
Cooling period / y positioning time closed		tM	off/0.100	1000	1.000	s
Actuating pulse interval		tA	20	600 (9980 if S2=1)	200	ms
Length of actuating pulse		tE	20		200	ms
Filter time AE 1		t1	off/0.100	1000	1.000	s
Filter time AE 2		t2	off/0.100	1000	1.000	s
Filter time AE 3		t3	off/0.100	1000	1.000	s
Filter time AE 4		t4	off/0.100	1000	1.000	s
Constant c1		c1	-1.999	9.999	0.000	
Constant c2		c2	-1.999	9.999	0.000	
Constant c3		c3	-1.999	9.999	0.000	
Constant c4		c4	-1.999	9.999	1.000	
Constant c5		c5	-1.999	9.999	0.000	
Constant c6		c6	-9.99	9.99	0.00	
Constant c7		c7	+1.000	9.999	1.000	
Display refresh rate		dr	0.100	9.900	1.000	s

Table 2

1.6 Off-line Parameters (oFPA)

Parameters determining basic functions such as display elements, limit values, safety values, etc. See Table 3.

1.6.1 Accessing the oFPA List

- Press button (6) for about 6 sec. until "PS" flashes. Release the button, and "onPA" (selection level) is displayed. It is blocked if digital signal BLPS=1.
- Press button (15) several times until "oFPA" is displayed (selection level). It is blocked if digital signal BLS=1.
- Press button (11) for about 3 sec. (configuring level). The controller is now blocked, and the last value of y is retained.

1.6.2 Selection and Modification of Parameters

- Use buttons (14) or (15) to select parameter names from y digital indicator (9).
- Use buttons (7) or (8) to modify the parameter value in the w/x digital indicator (3).

- Repeat these steps until all desired parameters are set.

1.6.3 Exit to Process Control Level

- Press button (16) twice (selection level and process control level). The controller is now in manual mode.

oFPA - off-line Parameters					
Parameter	**Parameter Name**	**Min.**	**Max.**	**Factory Setting**	**Eng Unit**
Decimal point. w/x displayed	dP	_.---	----	___.-	-
Scale start value	dA	-1999	9999	0.0	
Full scale value	dE	-1999	9999	100.0	
Alarm 1	A1	-110% to 110% of dA, dE with S76 / S77 = 0/2/3/4/5		5.0	
Alarm 2 (A2≤A1)	A2			-5.0	
Alarm 3	A3			5.0	
Alarm 4 (A4≤A3)	A4			-5.0	
Alarm hysteresis	HA	0.1	10.0	1.0	%
Setpoint start of scale	SA	-10% to 110% of dA, dE		-5.0	
Setpoint full scale	SE			105.0	
Safety setpoint	SH			0.0	
Setpoint ramp time	tS	oFF / 0.100	9984	oFF	min
Ratio factor - start	vA	0.000	9.999	0.000	1
Ratio factor - end	vE	0.000	9.999	1.000	1
Safety manipulated variable	YS	-10.0	110.0	0.0	%
Split range left (Y1≤Y2)	Y1	0.0	100.0	50.0	%
Split range right	Y2	0.0	100.0	50.0	%
Linearizar output value L-1 (-10%) to L11 (110%) are equidistant input vertices. If S21=5, the values are standardized on dA to dE	L-1	-10.0	110.0	-10.0	%
	L0	-10.0	110.0	0.0	%
	L1	-10.0	110.0	10.0	%
	L2	-10.0	110.0	20.0	%
	L3	-10.0	110.0	30.0	%
	etc.	"	"	etc.	"
	up to	"	"	up to	"
	L11	-10.0	110.0	110.0	%

Table 3

1.7 Configuring Switches (StrS)

Switches that define how the instrument is configured. See the tables in Figure 4 , Figure 5 , Figure 6 , and Figure 7 .

1.7.1 Accessing the StrS List

- Press button (6) for about 6 sec. until "PS" flashes. Release the button, and "onPA" (selection level) is displayed. It is blocked if digital signal BLPS=1.
- Press button (15) several times until "StrS" is displayed (selection level). It is blocked if digital signal BLS=1.
- Press button (11) for about 3 sec. (configuring level). The controller is now blocked, and the last value of y is retained.

1.7.2 Select and Modify Configuring Switches

- Use buttons (7) or (8) to select configuring switch in the y digital indicator (9).
- Use buttons (14) or (15) to modify the configuring switch setting in the w/x digital indicator (3).
- Repeat these steps until all desired parameters are set.

1.7.3 Exit to Process Control Level

- Press button (13) twice (selection level and process control level). The controller is now in manual mode.

Table of StrS - Configuring Switches

Config. switch		Swit. posit.	Function
Basic settings	S1		**Controller type**
		[0]	Fixed setpoint / three-component controller / controller with 2 internal setpoints
		1	Slave/synchro / SPC controller
		2	DDC controller
		3	Ratio controller
		4	Control station / process variable indicator
		5	Fixed setpoint controller with 1 setpoint with control system connection *
		6	Slave controller without Int/Ext switchover with control system connection *
	S2		**Output structure**
		[0]	K output
		1	S output: two-step controller with 2 outputs heating / cooling
		2	S output: three-step controller for motorized drives, internal feedback
		3	S output: three-step controller for motorized drives, external feedback
	S3		**Mains frequency suppression**
		[0]	50 Hz
		1	60 Hz

Figure 4 sipar21d.tif

Table of StrS - Configuring Switches (Continued)

Config. switch		Swit. posit.	Function
Analog inputs	S4		**Input signal AE1 and transmitter fault signal**
		[0]	0...20 mA without MUF
		1	0...20 mA with MUF
		2	4...20 mA without MUF
		3	4...20 mA with MUF
	S5		**Input signal AE2 and transmitter fault signal**
		[0]	0...20 mA without MUF
		1	0...20 mA with MUF
		2	4...20 mA without MUF
		3	4...20 mA with MUF
	S6		**Input signal AE3 (Slot 1) and transmitter fault signal**
		[0]	0...20 mA or U,R,P,T without MUF
		1	0...20 mA or U,R,P,T with MUF
		2	4...20 mA or U without MUF
		3	4...20 mA or U with MUF
		4	UNI module min. on sensor breakage without MUF
		5	UNI module max. on sensor breakage without MUF
		6	UNI module min. on sensor breakage with MUF
		7	UNI module max. on sensor breakage with MUF
	S7		**Input signal AE4 (Slot 2) and transmitter fault signal**
		[0]	0...20 mA or U,R,P,T without MUF
		1	0...20 mA or U,R,P,T with MUF
		2	4...20 mA or U without MUF
		3	4...20 mA or U with MUF
	S8		**Input signal AE3 (Slot 1) with UNI module (only relevant when S6=4/5/6/7)**
		[0]	mV (linear), U or I with measuring range converter
		1	thermocouple with internal reference junction
		2	thermocouple with external reference junction
		3	PT100 4-wire connection
		4	PT100 3-wire connection
		5	PT100 2-wire connection
		6	Resistance based sensor where R < 500 Ω
		7	Resistance based sensor where 500 Ω ≤ R < 2,5 kΩ
	S9		**Type of thermocouple AE3 (Slot 1) with UNI module (only relevant when S8=1/2)**
		[0]	Type L
		1	Type J
		2	Type K
		3	Type S
		4	Type B
		5	Type R
		6	Type E
		7	Type N
		8	Type T
		9	Type U
		10	any type (without linearization)
	S10		**Temperature unit AE3 (Slot 1) with UNI module (only relevant when S8=1/2/3/4/5)**
		[0]	degree Celsius
		1	degree Fahrenheit
		2	Kelvin

Config. switch		Swit. posit.	Function
Analog inputs	S11		**Square root of AE1 to AE4**
	S12		AE1: no [0], yes 1
	S13		AE2: no [0], yes 1
	S14		AE3: no [0], yes 1
			AE4: no [0], yes 1
			Allocation of x1, x2, x3, yN, yR, z to AE1A to AE4A
			0%: x1 0, x2 0, x3/wEA/wvEA 0, yN 0, yR [0], z [0]
			AE1A: x1 [1], x2 1, x3/wEA/wvEA 1, yN 1, yR [0], z 1
			AE2A: x1 2, x2 [2], x3/wEA/wvEA 2, yN 2, yR 2, z 2
			AE3A: x1 3, x2 3, x3/wEA/wvEA [3], yN 3, yR 3, z 3
			AE4A: x1 4, x2 4, x3/wEA/wvEA 4, yN [4], yR 4, z 4
	S21		**Allocation of linearizer (see oFPA) to**
		[0]	none
		1	AE1
		2	AE2
		3	AE3
		4	AE4
		5	x1
Slot 3	S22		**Configuration of slot 3**
		[0]	nothing installed
		1	4 BA / 2 BE (BA3 - BA6 / BE3, BE4)
			4 BA / 1 BE (BA3 - BA6 / BE3, BE4=0)
		2	5 BE (BE3 - BE7)
		3	2 relays (BA3, BA4)
Digital inputs			**Allocation of control signals to digital inputs**
			Low: CB 0, He [0], N 0, Si 0, P [0], $\overline{TS}$ [0], +yBL [0], - yBL [0], BLB [0], BLS [0], BLPS [0]
			Basic unit BE1: CB 1, He 1, N [1], Si 1, P 1, $\overline{TS}$ 1, +yBL 1, - yBL 1, BLB 1, BLS 1, BLPS 1
			Basic unit BE2: CB 2, He 2, N 2, Si [2], P 2, $\overline{TS}$ 2, +yBL 2, - yBL 2, BLB 2, BLS 2, BLPS 2
			Slot 3 BE3: CB 3, He 3, N 3, Si 3, P 3, $\overline{TS}$ 3, +yBL 3, - yBL 3, BLB 3, BLS 3, BLPS 3
			Slot 3 BE4: CB 4, He 4, N 4, Si 4, P 4, $\overline{TS}$ 4, +yBL 4, - yBL 4, BLB 4, BLS 4, BLPS 4
			Slot 3 BE5: CB 5, He 5, N 5, Si 5, P 5, $\overline{TS}$ 5, +yBL 5, - yBL 5, BLB 5, BLS 5, BLPS 5
			Slot 3 BE6: CB 6, He 6, N 6, Si 6, P 6, $\overline{TS}$ 6, +yBL 6, - yBL 6, BLB 6, BLS 6, BLPS 6
			Slot 3 BE7: CB 7, He 7, N 7, Si 7, P [7], $\overline{TS}$ 7, +yBL 7, - yBL 7, BLB 7, BLS 7, BLPS 7
			High: CB [8], He -, N -, Si -, P 8, $\overline{TS}$ -, +yBL -, - yBL -, BLB -, BLS -, BLPS -
			Control signal logic of allocated digital inputs
			24V = High: CB [0], He [0], N [0], Si [0], P [0], $\overline{TS}$ [0], +/-yBL [0]
			0V = High: CB 1, He 1, N 1, Si 1, P 1, $\overline{TS}$ 1, +/-yBL 1
	S41		**Control signal CB**
		[0]	static, no acknowledgement
		1	static, with acknowledgement
		2	dynamic as impulse (flip-flop effect)

Figure 5

sipar21e.tif

Table of StrS - Configuring Switches (Continued)

Config. switch		Swit. posit.	Function
Setpoint switchover	S42		**Blocking of internal / external setpoint switchover**
		[0]	internal only
		1	external only
		2	no blocking
	S43		**x tracking with H or N (DDC) or SI**
		[0]	no
		1	yes
	S44		**Setpoint following CB failure**
		[0]	last wi
		1	safety setpoint SH
	S45		**Tracking of wi to actual setpoint w** resp. Tracking of wvi to actual setpoint ratio
		[0]	yes
		1	no
Control algorithm	S46		**Direction of action in relation to xd (xd = w - x)**
		[0]	normal (Kp > 0)
		1	reversed (Kp < 0)
	S47		**Connection of D element**
		[0]	xd
		1	x
		2	x1
		3	z direction of action against x
		4	z direction of action with x
	S48		**Choice of adaption**
		[0]	no adaption
		1	control response without overshoot
		2	control response with overshoot based on absolute value optimization
Output switchover	S49		**Priority N (DDC) or H**
		[0]	N (DDC)
		1	H
	S50		**Manual mode in case of transmitter fault**
		[0]	no switchover (display only)
		1	manual mode beginning with most recent y
		2	manual mode beginning with ys
	S51		**Manual / auto switchover using**
			Manual pushbutton Hi / Control signal He / Inhibit He_{ss}
		[0]	yes / yes/static / with
		1	no / yes/static / with
		2	No switchover to manual mode
		3	yes / yes/dynamic / with
		4	yes / yes/dynamic / without
	S52		**Iy shutdown in DDC or tracking mode (K controllers only)**
		[0]	no
		1	yes
	S53		**Limiting of manipulated variable YA / YE**
		[0]	Only effective in automatic mode
		1	effective in all modes
y display	S54		**Manipulated variable display**
		[0]	controller output y
		1	position feedback yR
		2	split range y1/y2
		3	no display
	S55		**Direction of action of manipulated variable display yAn**
		[0]	normal: yAn = y
		1	reversed: yAn = 100% - y

Config. switch		Swit. posit.	Function
Analog outputs	S56		**Allocation of controller variables to analog output**
		[0]	y 0 to 20 mA
		1	y 4 to 20 mA
		2	w 0 to 20 mA
		3	w 4 to 20 mA
		4	x 0 to 20 mA
		5	x 4 to 20 mA
		6	x1 0 to 20 mA
		7	x1 4 to 20 mA
		8	xd + 50% 0 to 20 mA
		9	xd + 50% 4 to 20 mA
Digital outputs	S57		**Allocation +/-Δy**

	BA1	BA2	BA7 (relay)	BA8 (relay)
[0]	-	-	+Δy	-Δy
1	+Δy	-Δy	-	-
2	-	-Δy	+Δy	-
3	+Δy	-	-	-Δy

Notes:
- S57 has priority over S58 to S68;

Allocation of signalling signals to digital outputs

		Basic unit		Slot 3				Basic unit	
	none	BA1	BA2	BA3	BA4	BA5	BA6	BA7 (relay)	BA8 (relay)
S58	$\overline{RB}$	[0]	1	2	3	4	5	6	7	8
S59	$\overline{RC}$	[0]	1	2	3	4	5	6	7	8
S60	H	[0]	1	2	3	4	5	6	7	8
S61	Nw	[0]	1	2	3	4	5	6	7	8
S62	A1	0	[1]	2	3	4	5	6	7	8
S63	A2	0	1	[2]	3	4	5	6	7	8
S64	A3	[0]	1	2	3	4	5	6	7	8
S65	A4	[0]	1	2	3	4	5	6	7	8
S66	MUF	[0]	1	2	3	4	5	6	7	8
S67	+Δw	[0]	1	2	3	4	5	6	7	8
S68	-Δw	[0]	1	2	3	4	5	6	7	8

Notes:
- If BA1/2 or BA7/8 have been allocated +/-Δy by S57, duplicated allocation is not possible!
- S67 and S68 if S1=4 (control system/process variable indicator).

Logic of BA on allocated signalling signals

		24V = High	0V = High
S69	$\overline{RB}$	[0]	1
S70	$\overline{RC}$	[0]	1
S71	H	[0]	1
S72	Nw	[0]	1
S73	A1/A2	[0]	1
S74	A3/A4	[0]	1
S75	MUF	[0]	1

Figure 6

sipar21f.tif

Table of StrS - Configuring Switches (Continued)

Config. switch		swit. posit.	Function
Limit monitors	S76 / S77		**Allocation of A1/A2 and A3/A4 to process variables** xd x1 x w wv wv y y1 y2 AE 1 AE 2 AE 3 AE 4 AE 1A AE 2A AE 3A AE 4A A1/A2: [0] 1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 A3/A4: [0] 1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16
	S78	[0] 1 2	**Function of limit monitor A1/A2** A1 max / A2 min A1 min / A2 min A1 max / A2 max
	S79	[0] 1 2	**Function of limit monitor A3/A4** A3 max / A4 min A3 min / A4 min A3 max / A4 max
	S80	[0] 1 2 3 4 5 6	**Display and setting of limit values A1 to A4 in the process control level** Limit value indicator: w/x digital indicator / w bargraph indicator(1); Adjustable no / no / no A1/A2 / no / no A1/A2/A3/A4 / no / no A1/A2 / no / A1/A2 A1/A2/A3/A4 / no / A1/A2/A3/A4 A1/A2 / A1/A2 / A1/A2 A1/A2/A3/A4 / A1/A2/A3/A4 / A1/A2/A3/A4 (1) If S80 = 5/6 the limit values are displayed all the time; w is not displayed; a violated limit value will flash (recommended if S1 = 4).
w/x display	S81	[0] 1 2 3 4 5 6	**w/x digital indicator - switchover** Display sequence I / II / III / IV x/xv / w / - / - x/xv / w / x1/xv / - x/xv / w/wi1/wvi / - / wE/wvE/wi2 x/xv / w/wi1/wvi / x1/xv / wE/wvE/wi2 x/xv / - / - / - - / w / - / - - / - / x1/xv / - Displayed variables identified by w or x signal lamps: 1 = steady light, 0,5 = flashing light, 0 = off Display sequence I / II / III / IV 1 / 0 / 0,5 (0 if S81=6) / 0 — x signal lamp 0 / 1 / 0 / 0,5 — w signal lamp
Start-up conditions	S82	[0] 1	**Restart following return of power** last mode of operation, last w, last y manual and internal mode, last w, for K and two-position controller Ys, for three-position controller last y
	S83	[0] 1	**Visual signal following return of power** no flashing of w/x digital indicator flashing of w/x digital indicator

Config. switch		Swit. posit.	Function
Serial interface	S84	[0] 1	**Serial interface (Slot 4)** no yes
	S85		**Data transmission** Received by DR21 / Control signal CB_{DE}/CB_{ES} / Source for w_E / Source for y_N 0: Nothing / only CB_{DE} / w_{EA} / y_N [1]: Configuration / CB_{DE} 2: Configuration / $CB_{DE} \vee CB_{ES}$ / w_{ES} / y_{ES} 3: Process variables / $CB_{DE} \wedge CB_{ES}$ 4: Status register / $CB_{DE} \vee CB_{ES}$ / w_{EA} / y_N 5: / $CB_{DE} \wedge CB_{ES}$
	S86	[0] 1 2 3 4 5	**Data transmission rate** 9600 Bit/s 4800 Bit/s 2400 Bit/s 1200 Bit/s 600 Bit/s 300 Bit/s
	S87	[0] 1	**Vertical parity** even odd
	S88	[0] 1 2	**Longitudinal parity - position** none after ETX before ETX
	S89	[0] 1	**Longitudinal parity** normal inverted
	S90	[0] to 31	**Station number** 0 to 31
	S91	[0] 1 to 25	**Time monitoring CB (ES)** 0 s 1 s to 25 s

Figure 7

sipar21g.tif

2 Electric Connections

The diagram in Figure 8 shows the electric connections of the basic process controller and input/output modules. The power supply unit is either a 24 V AC/DC auxiliary supply or a 230 V AC auxiliary supply, switchable to 115 V AC. The controller can be converted from 230 V AC to 115 V AC by changing the jumper settings inside the process controller housing. Figure 9 shows the connections to the terminal block for a S-controller and a K-controller.

Block Diagram

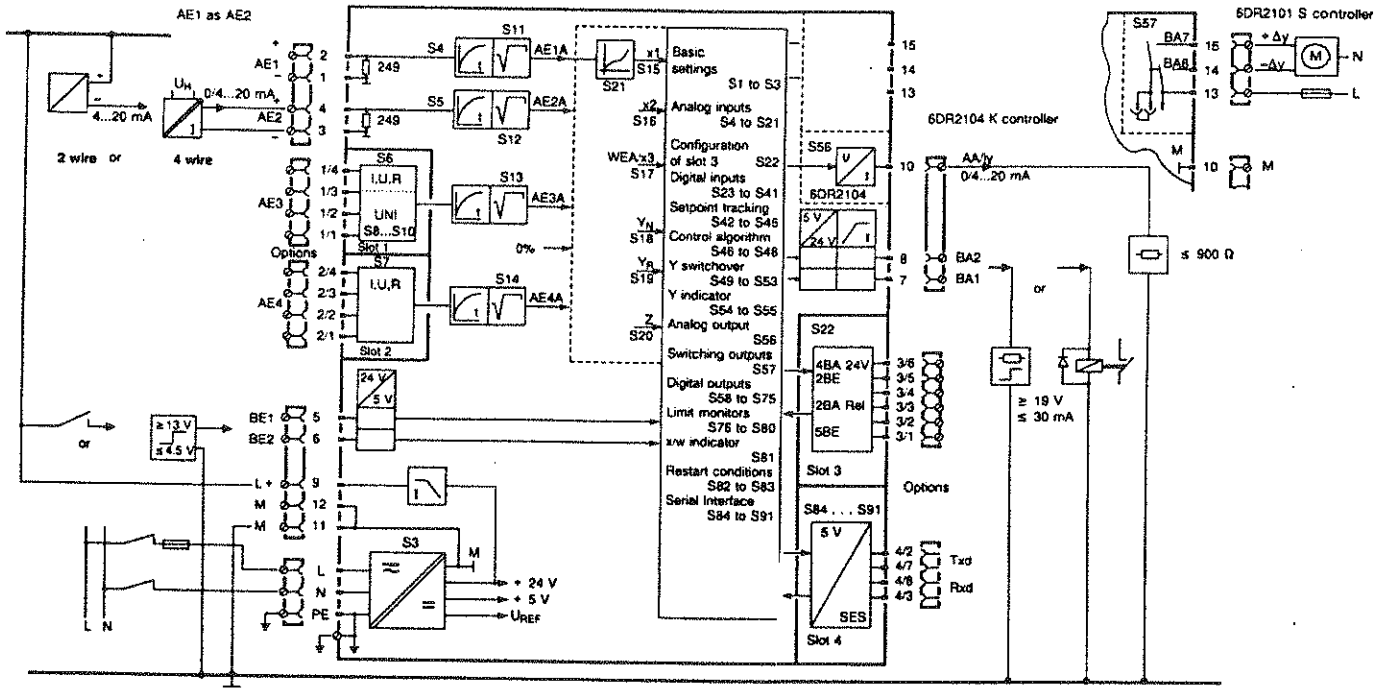


Figure 8 sipar21h.tif

2.1 Restart after Power Failure

Depending on the current loading of the instrument, short dips in the mains voltage are handled by the buffering capabillity of the power supply unit. In the event of a long power failure, the parameters and configuring data are stored in a non-volatile memory.

The most recent mode of operation, the last effective set point "w" and the manipulated variable values are also loaded into this memory. When power is restored, the controller automatically restarts.

Connection of the Standard Controller

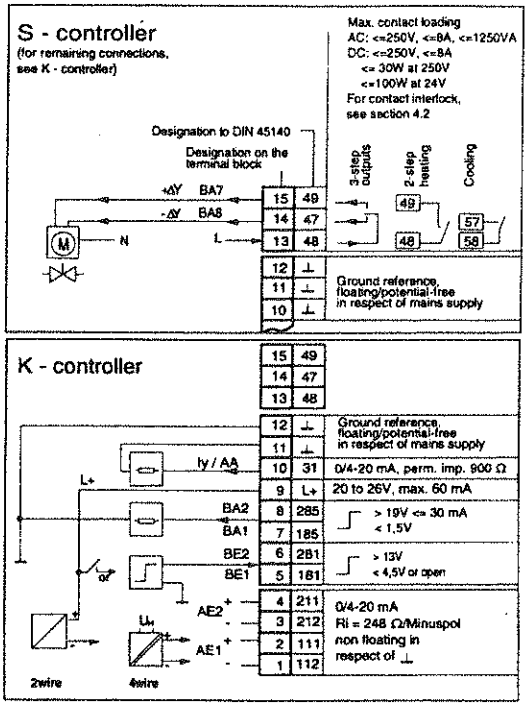


Figure 9 sipar21i.tif

3 Input and Output Modules

Additional modules to extend the functions of the process controller can be inserted in the rear end slots. The slots are coded to prevent modules being inserted incorrectly. The locations of the modules must be identified in the circuit diagrams and on the terminals before they are connected.

Some settings on the modules may need to be modified before they are inserted in the controller. Configuring switches are used to make the necessary connections to the inputs and outputs.

3.1 4DO/2DI Module

The module is used for additional digital outputs. The relay output module has four digital outputs. The output signals can be used for alarms. An illustration of the module is shown in Figure 10.

Assignment of functions and the logic are performed by using the configuring switches.

Illustration of the Switching Signal Module

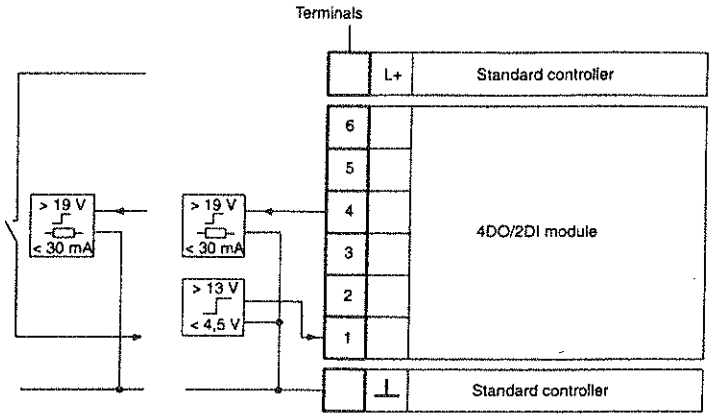


Figure 10

sipar21j.tif

3.2 U/I Module

This input/output module enables a current or voltage signal to be connected. The module is used to extend the number of analog inputs and provides electronic isolation through a differential amplifier with high common mode rejection. With this module connected, the controller can handle three analog input signals at the same time.

The changeover between current and voltage input is handled by coding jumpers on the module itself. In addition, the wiring of the connector is different.

An illustration of the U/I module and the connections are shown in Figure 11.

Illustration of the U/I Module

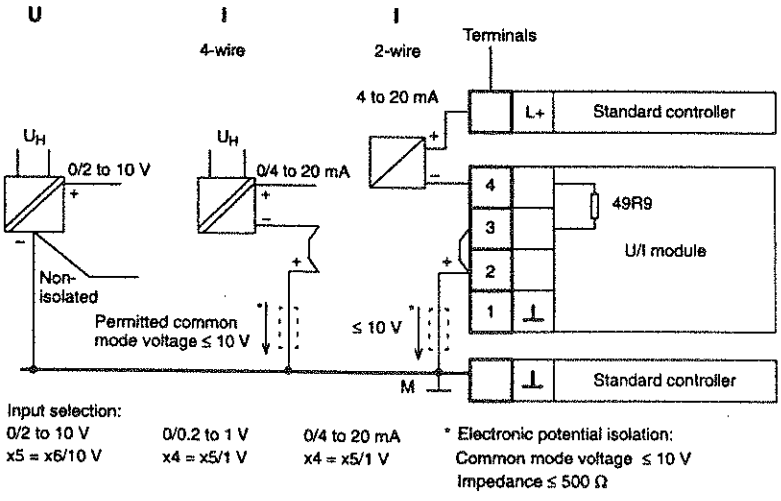


Figure 11

sipar21k.tif

Technical data

Technical data

General	
Mounting position	Any
Climatic classes	
- Storage: 1K2 according to DIN IEC 721 Part 3-1	-25 to +75 °C
- Transport: 2K2 according to DIN IEC 721 Part 3-2	-25 to +75 °C
- Operation: 3K3 according to DIN IEC 721 Part 3-3	0 to +50 °C
Protection acc. to EN 60 529	
Front	IP 64
Housing	IP 30
Terminals	IP 20

Controller design

- To DIN EN 61 010 Part 1 (IEC 1010 -1+A1)
- Protection class I according to IEC 536
- Outputs are functional extra-low voltages, safely isolated to DIN/VDE 0100 Part 410 Nov. 83
- Power supply isolated from field signals according to DIN/VDE 106 (DIN/VDE 0551, T1)
- Ventilation and creepage paths for surge class III and pollution level 2 according to DIN/VDE 0110 Part 1 Jan. 89, unless stated otherwise

The SIPART DR 21 controller has already acquired the following certifications:

- CE mark

  The controller conforms with the following harmonized standards:
  EU Certificate of Conformance no. DR21-1/1995 with respect to EMC Guidelines 89/336 EWG

- Emitted interference DIN EN 50 081-1	Issued: 3/93,	TÜV certified
- Immunity to interference DIN EN 50 082-2	Issued: 1/93,	TÜV certified
- NAMUR, NE 21	Issued: Mai 1993,	TÜV certified

  NS Guidelines 73/23 EWG

- EN 61 010 Part 1	Issued: 09.03.1993
EN 60 529	Issued: 25.06.1991

- Certification of Germanischer Lloyd
- DIN test and inspection mark as temperature controller, test basis DIN 3440
- TÜV certificate on approval of a component symbol for water level controller, test requirement according to VdTÜV water level 100 and water level 100/1

Weight of standard controller	Approx. 1.2 kg
Color	
Fascia frame	RAL 7037
Fascia	RAL 7035
Material	
Housing and fascia frame	Polycarbonate, reinforced with glass fiber
Front foil	Polyester
Power supply connections	
115/230 V AC	3-pin earthed plug IEC 320/V DIN 49 457A
24 V AC/DC	Special 2-pin plug
Connections for process signals	Multi-pin screw-type terminal blocks, protected against reversed polarity for cables of 1.5 mm² (AWG 14) diameter
Protective earth connection	Earthing screw
Mounting rail on rear of power supply unit (included with the coupling relay module)	

A rail can be mounted on the rear panel of the power supply. The rail is included in the delivery of the coupling relay mode.

The connector for the power supply and the screw-type terminal blocks for the process signals are part of the scope of the supply of the standard controller or the option modules. The only exception is the connector for the 6DR2803-8A interface module.

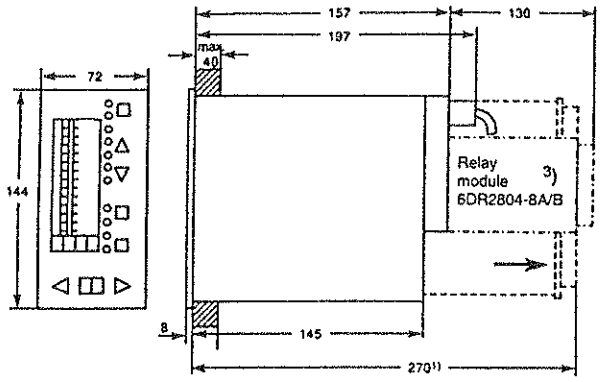
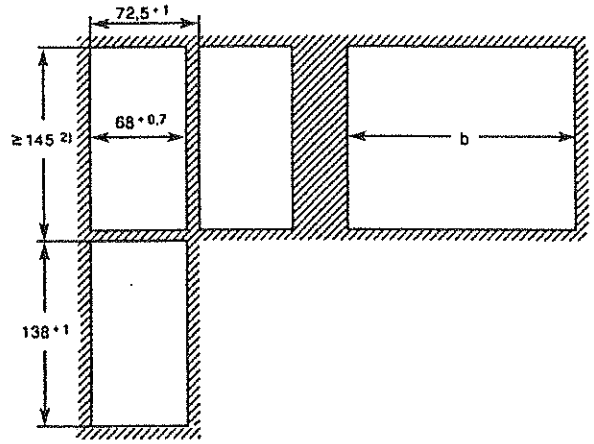


Fig. 5/11 SIPART DR21 controller, dimensions in mm



No. of devices	Cut-out width
2	140 + 1
3	212 + 1
4	284 + 1
.	.
.	.
10	716 + 1

Fig. 5/12 Panel cut-outs, dimensions in mm

1) Space required to change motherboard and module.

2) Observe ambient temperature when stacking with no intermediate spacing.

3) A relay module with 2 or 4 relays (6DR2804-8A/-8B) can be snapped onto the rear of the controller. This will increase the mounting depth by 130 mm.

Technical data (continued)

Power supply				
Rated voltage	Switchable 230 V AC	115 V AC	24 V AC/DC	
Operating voltage range	195 to 264 V AC	97 to 132 V AC	20 to 28 V AC	20 to 35 V DC [1]
Frequency range	48 to 63 Hz			-
Peak voltages to IEC 801-5 (Pulse: 1.2/50 µs)				
symmetric	1 kV	1 kV	0.5 kV	0.5 kV
asymmetric	2 kV	2 kV	1 kV	1 kV
Total of all output currents ($L+$, BA, AA and SES)	Max. 200 mA			
Power consumption				
Apparent power (capacitive)				
Standard controller				
- no options, without I_{Ext}	5 W/9 VA	5 W/9 VA	4 W/6 VA	4 W
- with options, without I_{Ext}	11 W/15 VA	11 W/15 VA	8.5 W/12VA	8.5 W
- with options, with I_{Ext}	15 W/19 VA	15 W/19 VA	12 W/17 VA	12 W
Permitted voltage dips at 0.85 U_N Standard controller with options	20 ms			
Test voltages (1 min)				
- Primary-secondary	1.5 kV AC		500 V AC	
- Primary-protective conductor	1.5 kV AC		500 V AC	
- Secondary-protective conductor	700 V DC		700 V DC	

Standard controller		
Analog inputs AE1, AE2		
Current	0/4 to 20 mA	
Input impedance	248 Ω	
Output range	-0.1 to +22 mA	
Filter time constant	10 ms	
Transmitter supply $L+$		
Rated voltage	20 to 26 V	
On-load current	≤ 60 mA, short-circuit proof	
Short-circuit current	≤ 200 mA, pulsed	
Digital inputs BE1 and BE2		
Signal status "0"	≤ 4.5 V or open	
Signal status "1"	≥ 13 V	
Input impedance	≥ 27 kΩ	
Digital outputs BA1 and BA2 (with wired OR diodes)		
Signal status "0"	≤ 1.5 V	
Signal status "1"	+19 to 26 V	
On-load current	≤ 30 mA	
Short-circuit current	≤ 50 mA, pulsed	
Analog output *ly* (K controller)		
Rated signal range	0 to 20 mA or 4 to 20 mA	
Output range	0 to 20.5 mA or 3.8 to 20.5 mA	
Load voltage	-1 to +18 V	
Max. permitted inductive load	0.1 H	
Relay output (S controller)		
Contact material	Ag-Ni	
Contact rating		
Max. switching voltage	250 V AC	250 V DC
Max. switching current	8 A	8 A
Max. switching capacity	1250 VA	100 W at 24 V 30 W at 250 V
Service life		
Mechanical	$2 \cdot 10^7$ switching operations	
Electrical 230 V AC, Ω loading	$2 \cdot 10^6$ switching operations	
Spark suppressor	22 nF and 220 Ω connected in series with a 420 V varistor wired in parallel	
CPU data		
Cycle time	100 ms	
A/D conversion		
Method	Successive approximation with > 120 measurements per input and averaging within 20 or 16.67 ms	
Resolution	11 bit ≙ 0.06 %	
Zero error	≤ 0.2 % of measuring span	
Gain error	≤ 0.2 % of measuring span	
Linearity deviation	≤ 0.2 % of measuring span	
Display technology		
Digital *x/w* indicator	4-digit, red, 7 segment LED display	
Character height	7 mm	
Display range	Adjustable start and full scale	
Numerical range	-1999 to +9999	
Decimal range	Adjustable (fixed-point)	
Refresh rate	0.1 to 9.9 s, variable	
Analog *x* indicator	Vertical row of 30 LEDs (red)	
Analog *w* indicator	Vertical row of 30 LEDs (green)	
Display range	0 to 100 %	
Resolution	1.7 %	
Digital *y* indicator	2-digit, red, 7 segment LED display	
Character height	7 mm	
Display range	0 to 100 %	
Resolution	1 %	
Refresh rate	0.1 to 9.9 s, variable	

Parameterization and Configuration
for
Thermal Oil Dump Controller

Note: all settings must be checked during commissioning.

On-Line Parameter (onPA) Settings:

Parameter	Name	Setting				Factory Setting	Unit
Filter time constant for filter xd (adaptive)	tF					OFF	s
Derivative action gain Vv	uu					5.000	1
Proportional gain Kp	cP					4	1
Reset time Tn	tn					10	s
Derivative action time Tv	tv					oFF	s
Response threshold	AH					0.0	%
Working point	Yo					AUTO	%
Lower limit of manipulated variable	YA					-5.0	%
Upper limit of manip. variable (YA≤YE)	YE					105.0	%
y positioning time open / heating period	tP					60	s
y positioning time closed / cooling period	tM					60	s
Minimum positioning pulse pause	tA					200	ms
Minimum positioning pulse length	tE					200	ms
Filter time constant AE 1	t1					1.000	s
Filter time constant AE 2	t2					1.000	s
Filter time constant AE 3	t3					1.000	s
Filter time constant AE 4	t4					1.000	s
Multiplication constant	c1					0.000	1
Multiplication constant	c2					0.000	1
Addition constant	c3					0.000	100%
Multiplication constant	c4					1.000	1
Addition constant	c5					0.000	100%
Multiplication constant	c6					0.00	1
Multiplication constant	c7					1.000	1
Display refresh rate	dr					1.000	s

Off-Line Parameter (oFPA) Settings:

Parameter	Name	Setting				Factory Setting	Unit
Decimal point for w/x display	dP					____.-	-
Start of scale value	dA					0.0	-
Full scale value	dE					250	-
Alarm 1	A1					250	-
Alarm 2 (A2≤A1)	A2					-5.0	-
Alarm 3	A3					5.0	-
Alarm 4 (A4≤A3)	A4					-5.0	-
Alarm hysteresis	HA					1	%
Lower setpoint limit	SA					195	-
Upper setpoint limit	SE					230	-
Safety setpoint	SH					200	-
Setpoint ramp time	tS					oFF	min.
Lower ratio factor	vA					0.000	1
Upper ratio factor	vE					1.000	1
Safety manipulated value	YS					0.0	%
Split range left Y1 (Y1≤Y2)	Y1					50.0	%
Split range right Y2	Y2					50.0	%
Interpolation point at -10%	L-1					-10	%
Interpolation point at 0%	L0					0	%
Interpolation point at 10%	L1					10	%
Interpolation point at 20%	L2					20	%
Interpolation point at 30%	L3					30	%
Interpolation point at 40%	L4					40	%
Interpolation point at 50%	L5					50	%
Interpolation point at 60%	L6					60	%
Interpolation point at 70%	L7					70	%
Interpolation point at 80%	L8					80	%
Interpolation point at 90%	L9					90	%
Interpolation point at 100%	L10					100	%
Interpolation point at 110%	L11					110	%

Configuring Switch (StrS) Settings:

Switch No.	Setting				Factory Setting
1					0
2					1
3					1
4					2
5					2
6					0
7					0
8					0
9					0
10					0
11					0
12					0
13					0
14					0
15					1
16					0
17					0
18					4
19					0
20					0
21					0
22					0
23					8
24					0
25					1
26					2
27					0
28					0
29					0
30					0
31					0
32					0
33					0
34					0
35					0
36					0
37					0
38					0
39					0
40					0
41					0
42					0
43					0
44					0
45					0
46					1
47					0
48					0
49					0
50					0

Switch No.	Setting				Factory Setting
51					0
52					0
53					0
54					3
55					0
56					0
57					0
58					0
59					0
60					0
61					0
62					0
63					0
64					0
65					0
66					0
67					0
68					0
69					0
70					0
71					0
72					0
73					0
74					0
75					0
76					11
77					11
78					1
79					1
80					0
81					0
82					0
83					0
84					0
85					0
86					0
87					0
88					0
89					0
90					0
91					0

Parameterization and Configuration
for
Thermal Oil Flow Controller

Note: all settings must be checked during commissioning.

On-Line Parameter (onPA) Settings:

Parameter	Name	Setting				Factory Setting	Unit
Filter time constant for filter xd (adaptive)	tF					OFF	s
Derivative action gain Vv	uu					5.000	1
Proportional gain Kp	cP					20	1
Reset time Tn	tn					60	s
Derivative action time Tv	tv					oFF	s
Response threshold	AH					0.0	%
Working point	Yo					0	%
Lower limit of manipulated variable	YA					-5.0	%
Upper limit of manip. variable (YA≤YE)	YE					105.0	%
y positioning time open / heating period	tP					60	s
y positioning time closed / cooling period	tM					60	s
Minimum positioning pulse pause	tA					200	ms
Minimum positioning pulse length	tE					200	ms
Filter time constant AE 1	t1					1.000	s
Filter time constant AE 2	t2					1.000	s
Filter time constant AE 3	t3					1.000	s
Filter time constant AE 4	t4					1.000	s
Multiplication constant	c1					0.000	1
Multiplication constant	c2					0.000	1
Addition constant	c3					0.000	100%
Multiplication constant	c4					1.000	1
Addition constant	c5					0.000	100%
Multiplication constant	c6					0.00	1
Multiplication constant	c7					1.000	1
Display refresh rate	dr					1.000	s

Off-Line Parameter (oFPA) Settings:

Parameter	Name	Setting				Factory Setting	Unit
Decimal point for w/x display	dP					____.-	-
Start of scale value	dA					0.0	-
Full scale value	dE					0	-
Alarm 1	A1					100	-
Alarm 2 (A2≤A1)	A2					-5.0	-
Alarm 3	A3					5.0	-
Alarm 4 (A4≤A3)	A4					-5.0	-
Alarm hysteresis	HA					1	%
Lower setpoint limit	SA					68	-
Upper setpoint limit	SE					82	-
Safety setpoint	SH					77	-
Setpoint ramp time	tS					oFF	min.
Lower ratio factor	vA					0.000	1
Upper ratio factor	vE					1.000	1
Safety manipulated value	YS					0.0	%
Split range left Y1 (Y1≤Y2)	Y1					50.0	%
Split range right Y2	Y2					50.0	%
Interpolation point at -10%	L-1					-10	%
Interpolation point at 0%	L0					0	%
Interpolation point at 10%	L1					10	%
Interpolation point at 20%	L2					20	%
Interpolation point at 30%	L3					30	%
Interpolation point at 40%	L4					40	%
Interpolation point at 50%	L5					50	%
Interpolation point at 60%	L6					60	%
Interpolation point at 70%	L7					70	%
Interpolation point at 80%	L8					80	%
Interpolation point at 90%	L9					90	%
Interpolation point at 100%	L10					100	%
Interpolation point at 110%	L11					110	%

Configuring Switch (StrS) Settings:

Switch No.	Setting				Factory Setting
1					0
2					1
3					1
4					2
5					2
6					0
7					0
8					0
9					0
10					0
11					0
12					0
13					0
14					0
15					1
16					0
17					0
18					4
19					0
20					0
21					0
22					0
23					8
24					0
25					1
26					2
27					0
28					0
29					0
30					0
31					0
32					0
33					0
34					0
35					0
36					0
37					0
38					0
39					0
40					0
41					0
42					0
43					0
44					0
45					0
46					0
47					0
48					0
49					0
50					0

Switch No.	Setting				Factory Setting
51					0
52					0
53					0
54					3
55					0
56					0
57					0
58					0
59					0
60					0
61					0
62					0
63					0
64					0
65					0
66					0
67					0
68					0
69					0
70					0
71					0
72					0
73					0
74					0
75					0
76					11
77					11
78					1
79					1
80					0
81					0
82					0
83					0
84					0
85					0
86					0
87					0
88					0
89					0
90					0
91					0

Parameterization and Configuration
for
Thermal Oil Load Controller

Note: all settings must be checked during commissioning.

On-Line Parameter (onPA) Settings:

Parameter	Name	Setting				Factory Setting	Unit
Filter time constant for filter xd (adaptive)	tF					OFF	s
Derivative action gain Vv	uu					5.000	1
Proportional gain Kp	cP					1	1
Reset time Tn	tn					60	s
Derivative action time Tv	tv					oFF	s
Response threshold	AH					0.0	%
Working point	Yo					0	%
Lower limit of manipulated variable	YA					-5.0	%
Upper limit of manip. variable (YA≤YE)	YE					105.0	%
y positioning time open / heating period	tP					60	s
y positioning time closed / cooling period	tM					60	s
Minimum positioning pulse pause	tA					200	ms
Minimum positioning pulse length	tE					200	ms
Filter time constant AE 1	t1					1.000	s
Filter time constant AE 2	t2					1.000	s
Filter time constant AE 3	t3					1.000	s
Filter time constant AE 4	t4					1.000	s
Multiplication constant	c1					0.000	1
Multiplication constant	c2					0.000	1
Addition constant	c3					0.000	100%
Multiplication constant	c4					1.000	1
Addition constant	c5					0.000	100%
Multiplication constant	c6					0.00	1
Multiplication constant	c7					1.000	1
Display refresh rate	dr					1.000	s

Off-Line Parameter (oFPA) Settings:

Parameter	Name	Setting				Factory Setting	Unit
Decimal point for w/x display	dP					___.-	-
Start of scale value	dA					0.0	-
Full scale value	dE					0	-
Alarm 1	A1					250	-
Alarm 2 (A2≤A1)	A2					-5.0	-
Alarm 3	A3					5.0	-
Alarm 4 (A4≤A3)	A4					-5.0	-
Alarm hysteresis	HA					1	%
Lower setpoint limit	SA					185	-
Upper setpoint limit	SE					230	-
Safety setpoint	SH					200	-
Setpoint ramp time	tS					oFF	min.
Lower ratio factor	vA					0.000	1
Upper ratio factor	vE					1.000	1
Safety manipulated value	YS					0.0	%
Split range left Y1 (Y1≤Y2)	Y1					50.0	%
Split range right Y2	Y2					50.0	%
Interpolation point at -10%	L-1					-10	%
Interpolation point at 0%	L0					0	%
Interpolation point at 10%	L1					10	%
Interpolation point at 20%	L2					20	%
Interpolation point at 30%	L3					30	%
Interpolation point at 40%	L4					40	%
Interpolation point at 50%	L5					50	%
Interpolation point at 60%	L6					60	%
Interpolation point at 70%	L7					70	%
Interpolation point at 80%	L8					80	%
Interpolation point at 90%	L9					90	%
Interpolation point at 100%	L10					100	%
Interpolation point at 110%	L11					110	%

Configuring Switch (StrS) Settings:

Switch No.	Setting				Factory Setting
1					0
2					1
3					1
4					2
5					2
6					0
7					0
8					0
9					0
10					0
11					0
12					0
13					0
14					0
15					1
16					0
17					0
18					4
19					0
20					0
21					0
22					0
23					8
24					0
25					1
26					2
27					0
28					0
29					0
30					0
31					0
32					0
33					0
34					0
35					0
36					0
37					0
38					0
39					0
40					0
41					0
42					0
43					0
44					0
45					0
46					0
47					0
48					0
49					0
50					0

Switch No.	Setting				Factory Setting
51					0
52					0
53					0
54					3
55					0
56					0
57					0
58					0
59					0
60					0
61					0
62					0
63					0
64					0
65					0
66					0
67					0
68					0
69					0
70					0
71					0
72					0
73					0
74					0
75					0
76					11
77					11
78					1
79					1
80					0
81					0
82					0
83					0
84					0
85					0
86					0
87					0
88					0
89					0
90					0
91					0

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5.0 Burner equipment

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5.0 Burner equipment

5.1	Oil burner type RMS
5.2	Oil burner pump
5.3	Electric oil preheater, type WEV 2.2
5.3.1	Viscosity - Temperature Chart
5.4	Burner oil / air compound regulation
5.5	Combustion head
5.6	Ignition electrodes
5.7	Burner fuel system
5.7.1	Nozzle Head
5.7.2	Nozzle recirculation and heating
5.7.3	Nozzle selection and pressure
5.7.4	Fitting and removal nozzles

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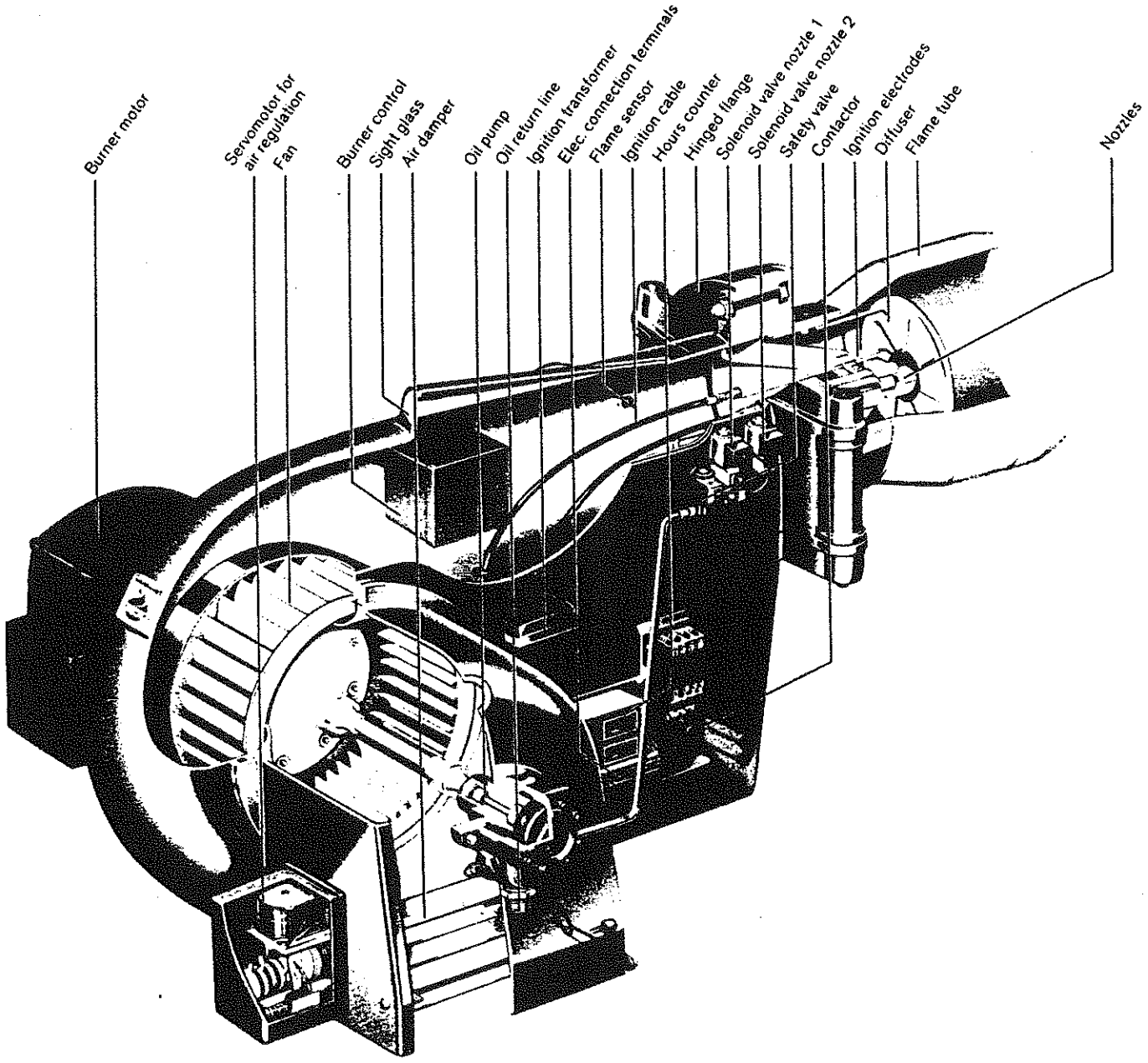
5.1 Aalborg Marine Boiler´s Oil Burner

Type RMS



(Showed without preheater)

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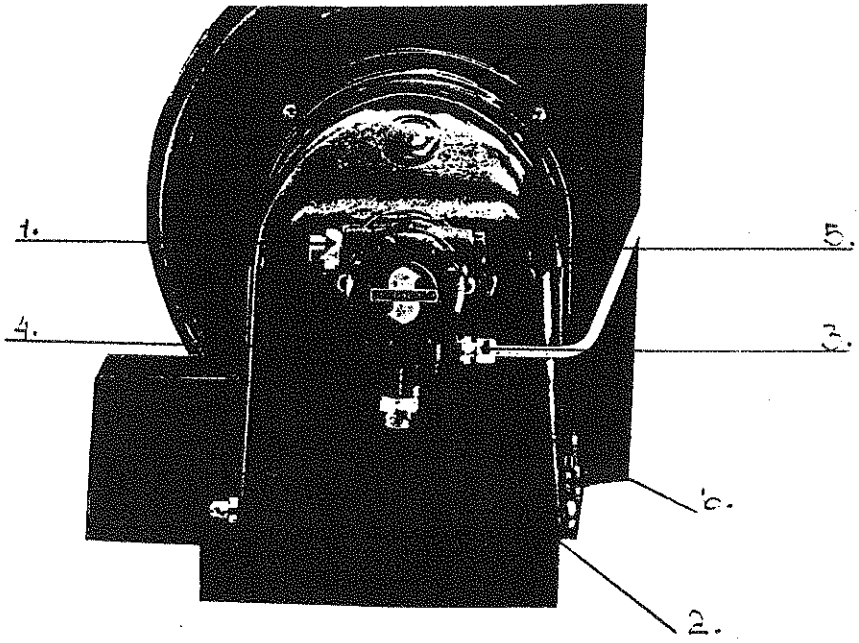
5.2 Oil burner pump



1. Suction intake line connection, pipe thread R 1/2".
   Can alternatively be connected to 5.

2. Return line connection. Pipe thread R 1/2".

3. Nozzle feed line to preheater.

4. Cap nut, below it pressure adjustment screw.

5. Vacuum gauge connection pipe, thread R 1/2".
   Can alternatively be connected to 1.

6. Connection pressure gauge, pipe thread R 1/8".

The oil burner pump, type E4, E6, E7 is prepared for installation into a "two pipe system".

The pump is equipped with a built-in pressure regulator with a quick working valve, which keeps the adjusted pressure stable.

In order to protect the pump against impurities in the oil a filter is also built-in.

IMPORTANT
The suction intake line must be filled with fuel oil prior to start up.

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Starting up.

Remove screw 5, add some oil, close the opening again, remove screw 6, start the burner and wait until bubblefree oil appears.

In order to test the vacuum on the suction side of the pump, screw the vacuum gauge into connection 5.

To test the oil pressure of the pump screw the pressure gauge into connection 6. Do not use hemp or oakum.

The suction head measured at the pump should not exceed 0.5 kp/cm.
Max. feed pressure before the pump 5.0 bar.

Adjustment of pump deliver pressure.

Remove cap nut 4. Adjust the oil pressure with a screwdriwer.Clockwise rotation increases pressure. Anticlockweise rotation decreases pressure.

Recommended pressure for diesel oil	: between 20 - 30 bar
Recommended pressure for heavy fuel oil	: not below 25 bar

Exchange of the oil pump.

If the oil pump fails completely, it is easy to exchange by a new one.
The directions are to be followed in the order stated:

Exchange of the oil pump:

1. Close both oil valves.
2. Place oil tray under pump and preheater.
3. Disconnect oil hoses, on pump.
4. Disconnect the other oil pipes on pump.
5. Remove plastic cover for observation hole on air intake over oil pump.
6. Unscrew the two bolts in pump flange.
7. Oil pump is now ready to be drawn out.

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8. Notice:
Coupling center piece, between oil pump and fan wheel is loose and may be taken out through the air intake for inspection.

9. The flexible coupling crosses must be renewed if necessary. Place the coupling crosses into the coupling center piece.

10. Draw out the oil pump.

11. Demount coupling part from pump shaft.

12. Place coupling part on the new pump shaft.

13. Demount pressure gauge with cock.

14. Mount pressure gauge with cock on the new pump.

15. Replace the new pump together with the coupling center piece. Care must be taken that the engagement of the two coupling crosses is done correctly.

16. Screw in the two bolts in the pump flange.

17. Adjust tolerance (gab) between the coupling parts to 0.5 mm, i.e. the flexible coupling crosses will tighten slightly.

18. Remount pipe and hose connections.

19. Attention.
The pump and pipes must be filled with oil before the pump is started. Please follow the starting up instructions for the oil pump

It cannot be recommended that you try to repair the pump yourself, in case of break down then exchange it and send the defective pump to repair or exchange with a new one, alternative with an overhauled spare pump (repaired pump at full guarantee).

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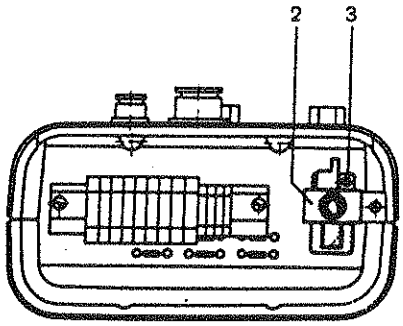
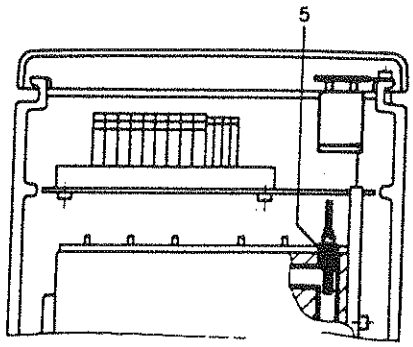
5.3 Electric oil preheater





Legend

1* Regulating thermostat
2 Temperature limit thermostat
3 Reset for temperature limit thermostat
4* Oil release thermostat
5 Pt 100 resistance temperature sensor
(The electronic CROW controller is fitted in the panel).

* On the WEV2.2/01 and the WEV3/01 this function is performed by the CROW controller which is fitted in the panel.

On these preheaters the oil supply pipe coils are cast integral in an aluminium alloy plate.

The heat energy is transferred by the electric heating element via the aluminium casting and the pipe coils to the fuel oil to be heated.
This ensures an even and rapid transfer of heat thus preventing local overheating on the heating element and the exchanger surface to the oil.

Further advantages are the high efficiency and low pressure loss (for pressure loss diagram see page 6).

The required oil temperature is set at the CROW regulator fitted in the panel (setting range 40 - 180°C) and at the same time the switch point of the oil release contact is altered, which is 5K below the set point. The oil temperature in the oil preheater is supplied to the CROW regulator as an actual value via the Pt 100 resistance temperature sensor (5). The temperature limit thermostat (2) has to switch off and isolate the heating if the controller does not switch off for any reason. Restart is only possible after actuating the reset button (3).
The setting of the temperature limit thermostat should be approx 40K above the desired value regulator setting.

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Construction of the electrical control.

The heating element (1) of the oil preheater is switched via 2 contactors (7) and (9).

An electronic two point controller with PID control behaviour is fitted in the control panel to regulate the temperature. The oil temperature in the preheater is determined by a Pt 100 temperature sensor (3). A separate limit control (2) is fitted to limit the temperature.

The oil preheater heating elements (1) are designed so that they can be connected by bridging loops on the terminal strip (4) in star (e.g. 220V).

Function.

The oil temperature in the oil preheater is determined by the Pt 100 resistance temperature sensor and supplied to the CROW electronic two point controller as actual value.
The desired value for the oil temperature required is set on the setting knob on the front of the regulating control according to the scale.

If the oil temperature in the preheater (actual value) is less than the desired value, then the burner release contact (5) in the electronic controller is open and the contactor (9) is switched on via the regulating control. The safety contactor is energised by the non actuated limit control and the oil preheater heating is in operation. After the minimum temperature required has been reached in the oil preheater at 5K below the set desired value, the realease thermostat of the controller, terminal 50/51, is closed. The burner can now start when the heating appliance demands heat.

When the oil temperature in the preheater reaches the set point on the regulating control, the heating is switched off by the contactor. If due to a fault the heating does not switch off after the desired value has been reached, then the temperature limit control acts on the control voltages of the main contactor and the safety contactor, and positively shuts down the heating of the oil preheater. With this feature, mechanical faults in the contactor used to regulate the temperature are technically covered. Restart is only possible after the resetting of the temperature limit control.

In addition the regulating control is designed that the sensor monitoring ensures that the contactor shuts down the heating in the event of a short circuit, interruption of the sensor line or the sensor. In addition in the event of a short circuit of the sensor line the release thermostat is opened.

If the oil preheater heating fails during operating and falls below a permanently set temperature difference to the desired value, the release thermostat of the controller opens and shut down the burner.

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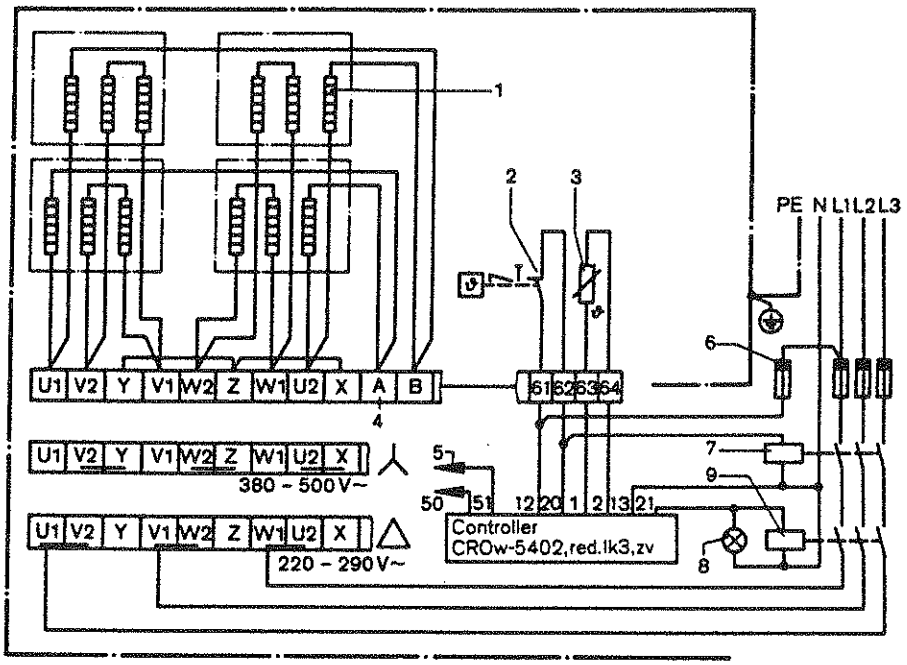

1	Heating element
2	Temperature limit control
3	Temperature sensor Pt 100
4	Terminal strip
5	Control circuit (burner control)
6	Fuse carriers
7	Safety contactor
8	Indicating lamp "On"
9	Contactor

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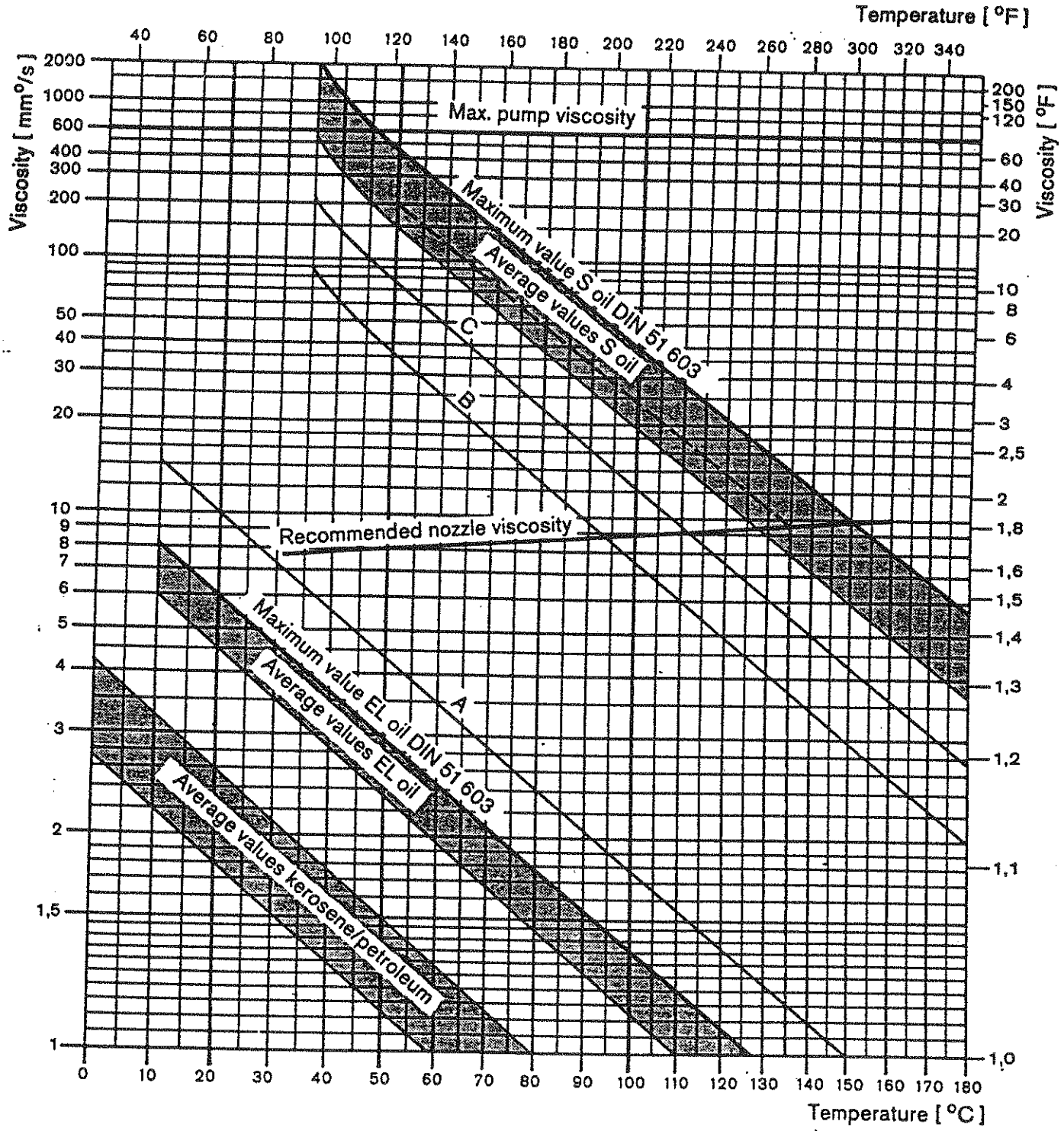
5.3.1 Viscosity - Temperature Chart



Determination of the preheating temperature
The preheating temperature to be determined can be taken from the viscosity - temperature chart. The viscosity of the fuel oil available must be known at a reference temperature. It should be noted that the thermostat must be set higher on account of the heat loss between oil preheater and nozzle.

Example
Known:
Oil viscosity: 200 mm²/s at 50°C
Required:
Preheating temperature in °C
Procedure to be followed:
From the viscosity reference temperature 50°C vertically up to the intersection with the viscosity 200 mm²/s, from there, parallel to the nearest fuel grade line, intersect the line "recommended nozzle viscosity". From this intersection vertically to the temperature axis. There read the desired preheating temperature

Recommendation
The following maximum viscosities in relation to nozzle size are to be noted.

In the area between the oil grade lines use:
A and B nozzles > 0.85 USgph,
B and C nozzles > 2.00 USgph and
over C nozzles > 3.00 USgph

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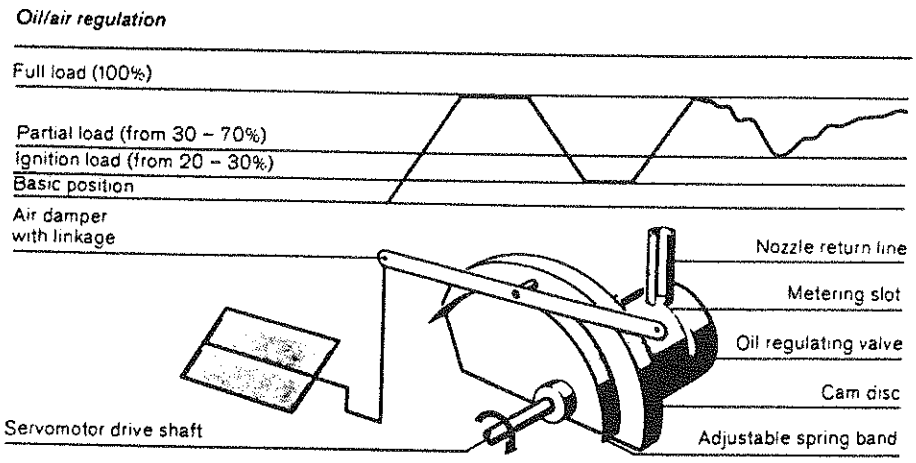
5.4 Burner oil / air compound regulation.

type SQM



The cam segment is driven clockwise by the servomotor, to the full load position. The adjustable spring band on the cam segment operates the air damper linkage and opens the damper for full air pre-purge.

At the end of the pre-purge period the servomotor returns to the ignition load position. In this position the oil control valve allow a large proportion of the oil to flow through the return line, and only a small quantity of oil will flow through the nozzle. The air flow is matched to the nozzle oil quantity.

The servomotor will drive the oil regulator valve and the air damper through the partial to the full load position. As the movement progresses, the air damper is opened and the oil control valve closes, whitch reduces the oil return quantity and increases the nozzle throughput.

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Adjusting the air quantity.

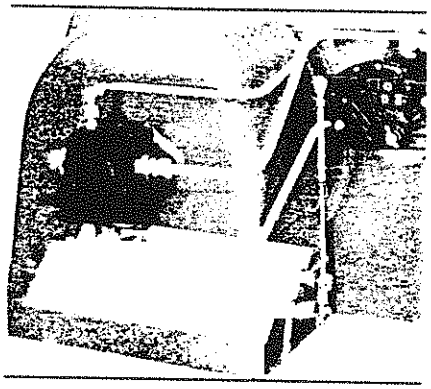
The cam has an adjustable spring band on the side which is moved by means of adjustable socket screws.
The air quantity is matched to the oil throughput required by adjusting the spring band on the cam.

The setting of the spring band is determined at various load position by flue gas measurements.

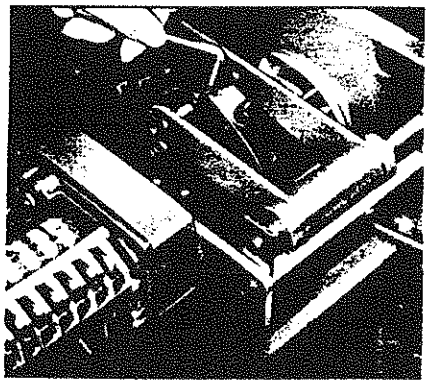
The outer scale on the cam shaft serves as a position indicator.

With the lever fitted on the gear box the cam shaft can be disengaged from the drive. This makes possible, manually, to turn the cam to any position required.
When the lever is in the vertical position the drive is engaged.

Air regulation on burners sizes 5 to 11



Setting the spring band



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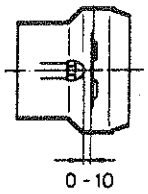
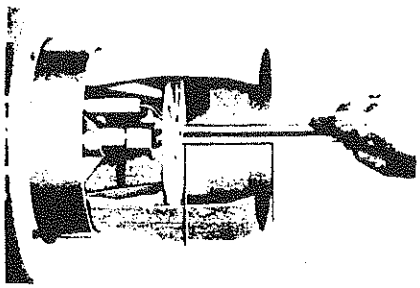
5.5 Combustion head.





The oil burners will always be delivered with the combustion head and air diffuser disc, which according to our calculations suit the specified boiler type and oil quantity in the best way.

The combustion head and the air diffuser are marked with numbers and therefore easy to identify.

Further adjustment, in order to reach the very best results can be done by moving the combustion head or the air diffuser disc.

Care must be taken to the position of the ignition electrodes that the proper spark-building is not disturbed.

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5.6 Ignition electrodes.

The adjustment dimensions are shown in the pictures.

The following must be observed:

1)The ignition spark must not track to the air diffuser disc of the nozzle.

2)The nozzle spray must not impinge on the ignition.

If a nozzle with a larger spray angle is fitted, then the electrodes must be pulled back, according to the above items.

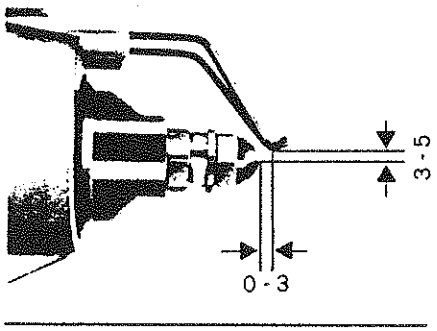
As the boiler conditions may vary greatly in individual cased, we can only indicate guide dimensions to you.

If ignition troubles occour, even if our data has been followed, a more favourable adjustment of the electrodes, suitable for the present conditions, must be found by experiments.

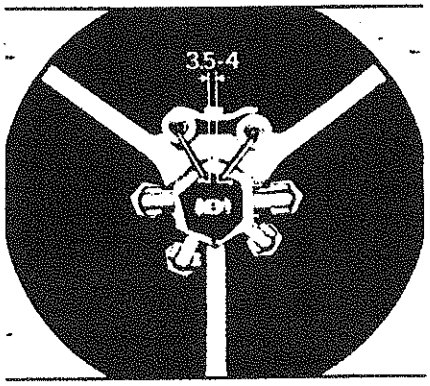
Electrodes size:

Total lenght	: 220 mm
Length of porcelain	: 125 mm
Diameter of porcelain	: 14 mm
Length of free electrodes	: 75 mm
Diameter of electrodes	: 3 mm

Ignition electrode-nozzle setting



Regulating burners RL8 to RL11, RMS7 to RMS11



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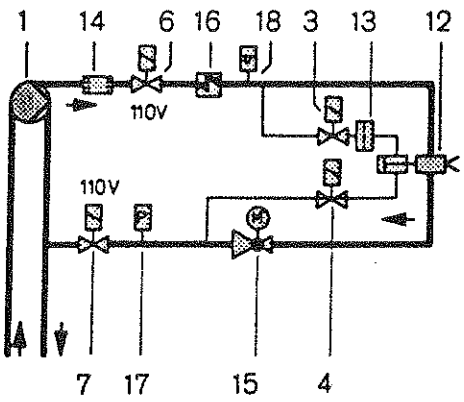
5.7 Burner fuel system.

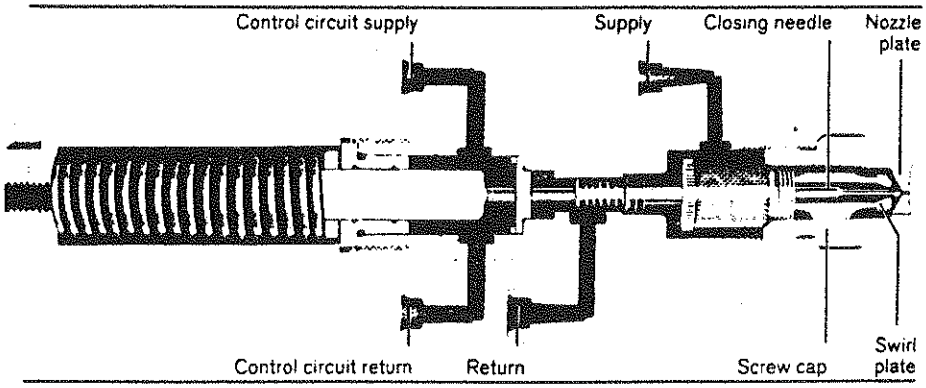
RMS7 to RMS11



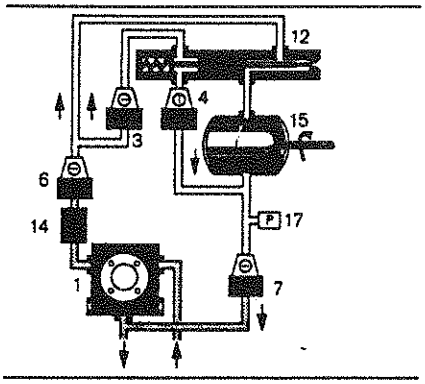
1: Pump without solenoid valve
6: Solenoid valve (normally closed)
4: Solenoid valve (normally open)
3: Solenoid valve (normally closed)
7: Solenoid valve (normally closed)
12: Nozzle head R
13: Restricting orifice
14: Filter
15: Oil regulator
16: Oil preheater
17: Pressure switch, return
18 : Thermostat

5.7.1 Nozzle head.

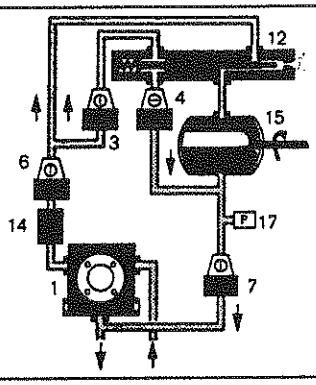
Nozzle head RL and RMS burners



Oil system diagram 1 (RL)



Oil system diagram 2 (RL)



Operation.

Functional diagram 1
During burner shutdown and the pre-purge period, the shut off devices 14, 11 and 15 are closed and shut off device 12 is open.

The ring main during burner shutdown or the pump pressure during pre-purge is present at shut off devices 14 or 15.

Functional diagram 2
After the pre-purge period has elapsed (the servomotor is in ignition position) on RL burners, The shut off devices 14, 11 and 15 open and shut off devices 12 closes. The fuel oil is now released for combustion.

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On RMS burners shut off devices 6 and 7 only open for oil circulation. After the oil circulation period has elapsed (max. 45 sec.), shut of device 11 opens and shut off 4 closes and releases the fuel oil for combustion.

The pressure switch 17 (when fitted) checks the pressure in the return. If The pressure increase is too high, the burner shuts down. Shut off devices 6, 13 and 7 close and simultaneously shut off device 4 opens.

Note
The shut off devices (solenoid valves 6 and 7) are electrically connected in series. The voltage of the solenoid coils is therefore 110V with 220V mains voltage.

On the shut off device (solenoid valve) 4, the directional arrow on the solenoid valve must point towards the nozzle. This means that the solenoid valve in the nozzle return is fitted against the flow direction during burner operation.

The shut off device in the nozzle head (nozzle shut off valve) is effective as one safety shut off device in the return line and one in the supply line.

Together with the safety shut off device 6and 7 and the safety shut off device in the nozzle head, the requirement for two shut off devices in both the supply and return is fulfilled.

Maintance and cleaning:

The ball valve can be removed for cleaning. For this purpose the nozzle head must be unscrewed. Nozzle can be exchanged, without impairing the function of the stop valve in any way. It is advisable to close the stop valves in the suction intake and return line during the exchange of the nozzle. In this manner entry off air into the oil line system of the burner isprevented.

Cleaning of the nozzle head is made by washing in petroleum or at best by means of pressure air.

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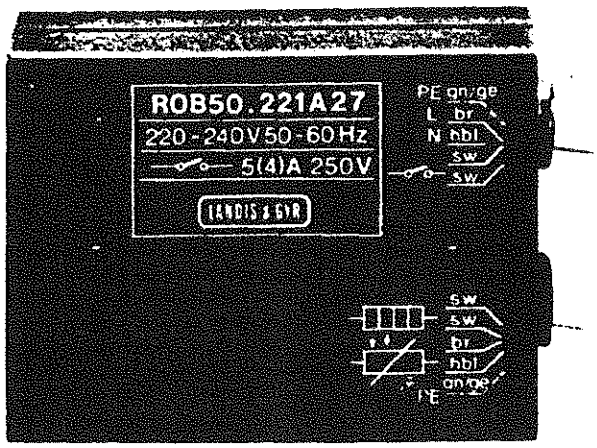
5.7.2 Nozzle recirculation and heating.



5.7.3 Nozzle selection and pressure.

The charts shows the throughput of the spill type nozzle in relation to the supplypressure.
The pump pressure on RL burners should be between 20 and 30 bar.

It should be ensured that the minimum pressure does not fall below 20 bar even at the lowest regulator cam position.

On RMS burners the pump pressure must not fall below 25 bar. When, due to nozzle sizing the burner rating with the return flow closes (regulator position 10) can only be activated at a pressure below 25 bar, the pump pressure must be increased to 25 bar and the higher oil throughput that results is reduced by limiting the oil regulator movement. This is done by adjusting the limit switch in the servomotor to the appropriate lower regulating position. The range of regulating is reduced by this action.

Nozzle return pressure
Spill type nozzle K3
The nozzle return pressure must be measured when commissioning. In normal cases it should not be set below 10 bar for partial load.

Spill type nozzle WS4
The nozzle return pressure must be measured when commissioning. In normal cases it should not be set below 8 bar for partial load.

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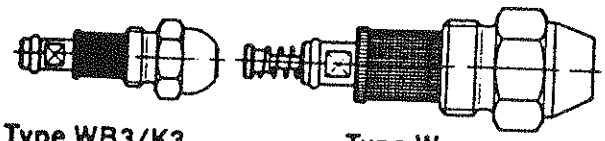
Cleaning nozzles

The nozzle is dismantled into its individual parts and washed with paraffin. The filter should always be changed. If other individual parts are faulty or worn the nozzle should be replaced.

Spill type nozzles



Type WB3/K3 **Type W**

Atomising pressure

Burner types	Atomising pressure approx bar
RL5 to RL11	20 - 30
RMS7 to RMS11	25 - 30

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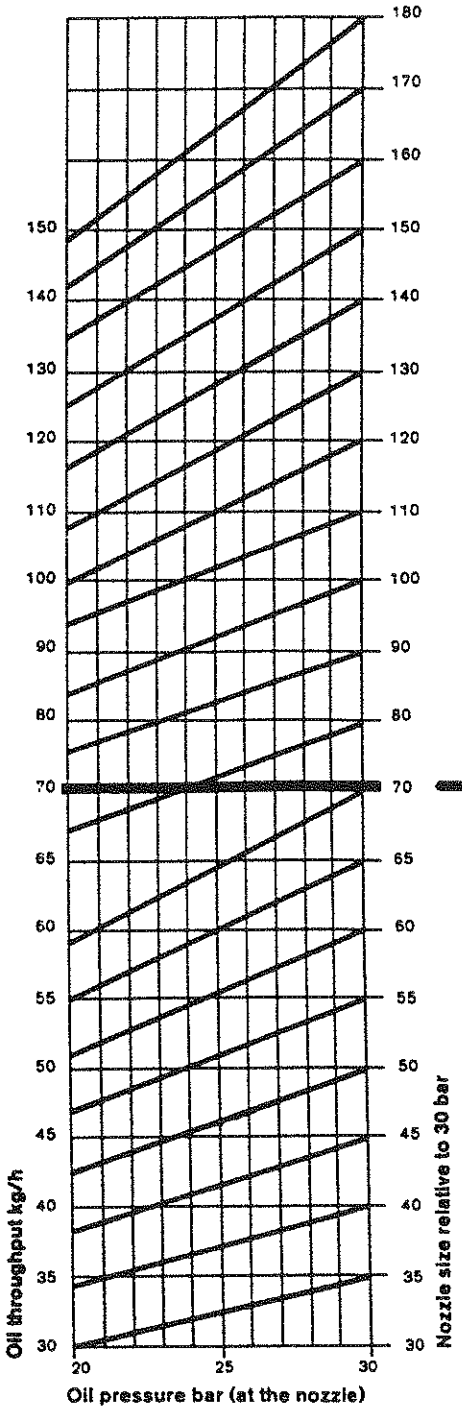
Nozzle selection chart type WB3/K3

Spill type nozzles — Type WB3 up to 70 kg/hr
Type K3 80-180 kg/hr

Spray angle 50°

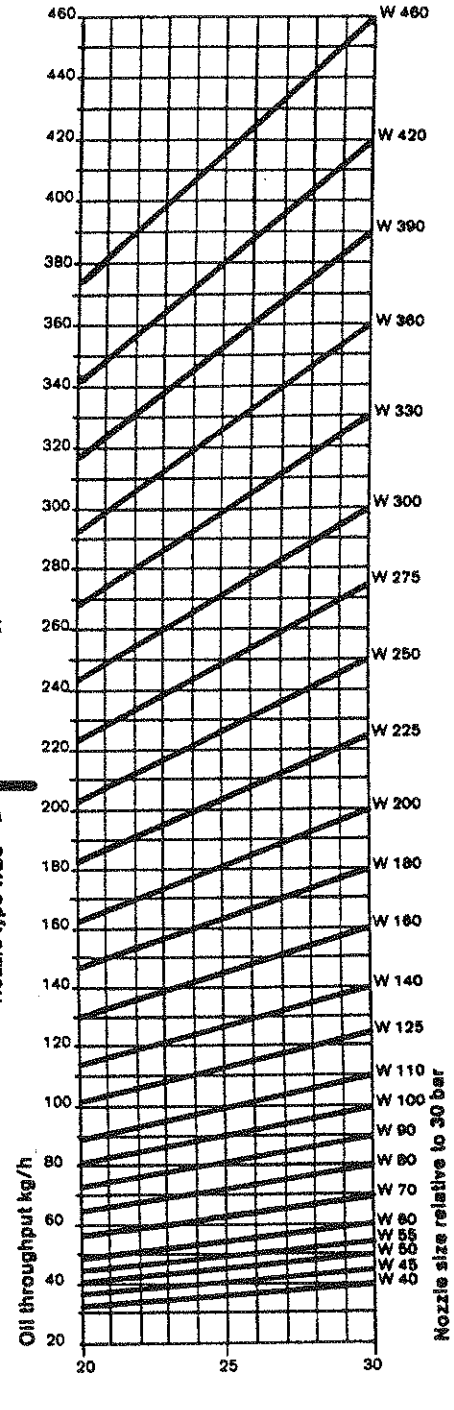


Nozzle selection example, type WB3

Required oil throughput _____ 50 kg/h
Nozzle size from chart _____ 50
Oil pressure from chart _____ 30 bar

Nozzle selection chart, type W Series 6

Spill type nozzles W, Series 4
Spray angle 50°



Nozzle selection example, Type W

Required oil throughput _____ 160 kg/h
Nozzle size from chart _____ W160
Oil pressure from chart _____ 30 bar

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5.7.3 Nozzle selection and pressure.

The charts shows the throughput of the spill type nozzle in relation to the supply pressure.
The pump pressure on RL burners should be between 20 and 30 bar.

It should be ensured that the minimum pressure does not fall below 20 bar even at the lowest regulator cam position.

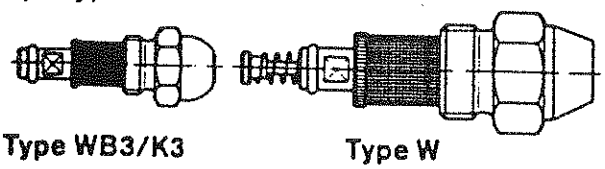
On RMS burners the pump pressure must not fall below 25 bar. When, due to nozzle sizing the burner rating with the return flow closes (regulator position 10) can only be activated at a pressure below 25 bar, the pump pressure must be increased to 25 bar and the higher oil throughput that results is reduced by limiting the oil regulator movement. This is done by adjusting the limit switch in the servomotor to the appropriate lower regulating position. The range of regulating is reduced by this action.

Nozzle return pressure
Spill type nozzle K3
The nozzle return pressure must be measured when commissioning. In normal cases it should not be set below 10 bar for partial load.

Spill type nozzle WS4
The nozzle return pressure must be measured when commissioning. In normal cases it should not be set below 8 bar for partial load.

Cleaning nozzles
The nozzle is dismantled into its individual parts and washed with paraffin. The filter should always be changed. If other individual parts are faulty or worn the nozzle should be replaced.

Spill type nozzles



Type WB3/K3 **Type W**

Atomising pressure

Burner types	Atomising pressure approx bar
RL5 to RL11	20 – 30
RMS7 to RMS11	25 – 30

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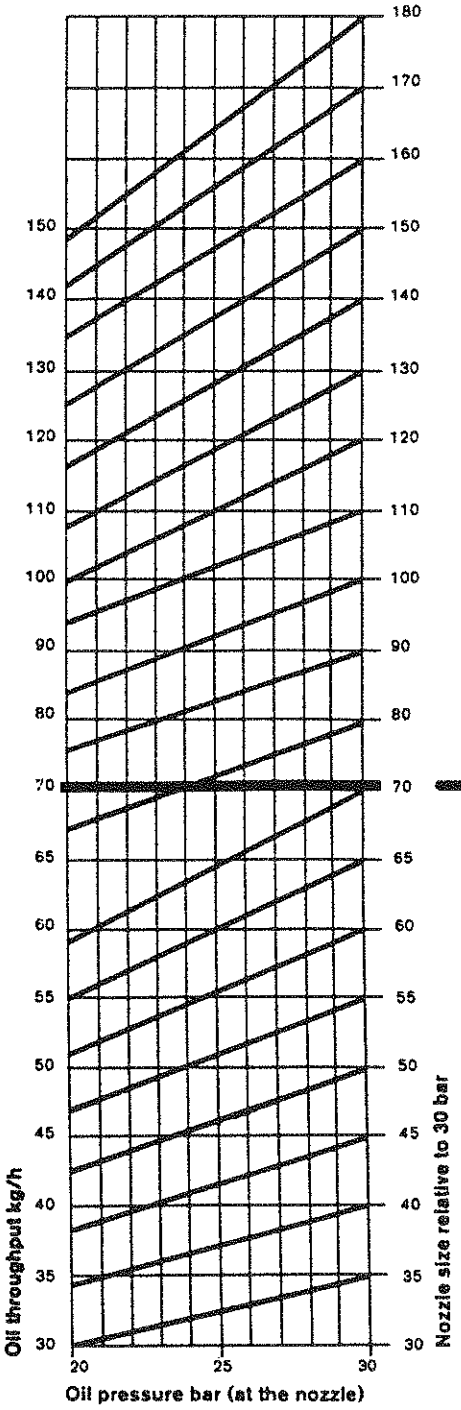
Nozzle selection chart type WB3/K3

Spill type nozzles — Type WB3 up to 70 kg/hr
Type K3 80-180 kg/hr

Spray angle 50°

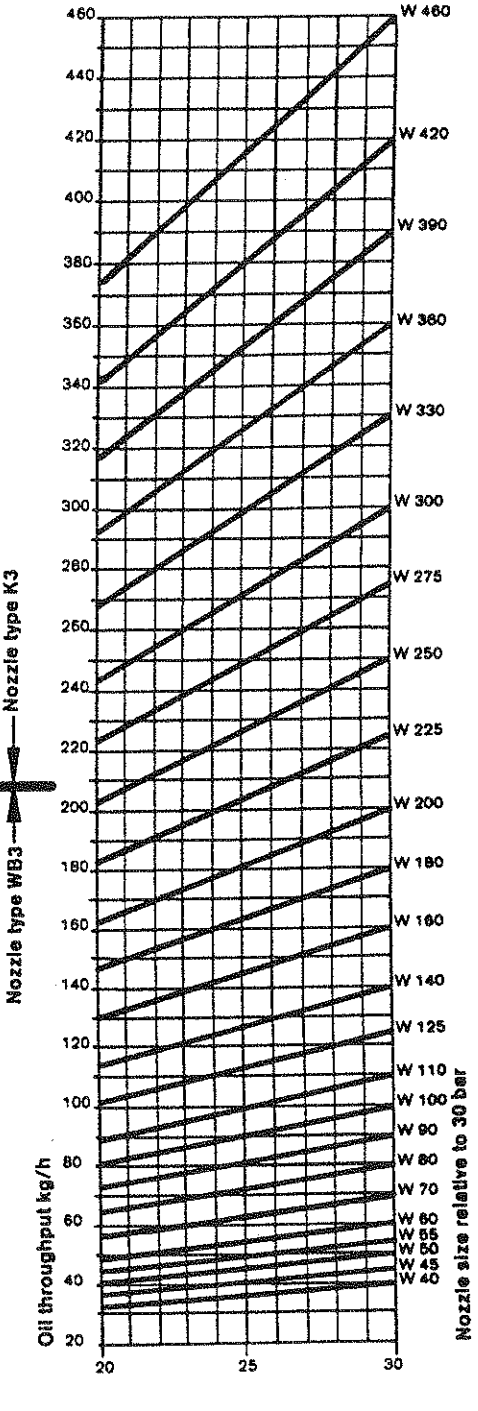


Nozzle selection example, type WB3

Required oil throughput _____ 50 kg/h
Nozzle size from chart _____ 50
Oil pressure from chart _____ 30 bar

Nozzle selection chart, type W Series 6

Spill type nozzles W, Series 4
Spray angle 50°



Nozzle selection example, Type W

Required oil throughput _____ 160 kg/h
Nozzle size from chart _____ W160
Oil pressure from chart _____ 30 bar

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5.7.4 Fitting and removal nozzle.

It is very easy to inspect and change the oil nozzles on a Monarch oil burner, as the burner is constructed with a swing flange. Only the lock nut must be unscrewed and the casing can be swung aside.

For mounting/demounting of the oil nozzle a spanner with a width of 24 mm is used and at the same time the nozzle head is kept fixed by means of a spanner of 30 mm.

It is recommended that the nozzle are only cleaned, if they are really contaminated. For cleaning, the nozzle is taken a part and washed in a suitable fluid such as benzine or petrol. If available compressed air is the most suitable cleaning medium.

Solid object, such as steel needles, are completsly unsuitable for this purpose and they must not be used under any circumstances.

Due to alterations in viscosity and nozzle manufacturing tolerances a throughput variation of +/- 10% can apply.
In order to determine the exact oil throughtput it is necessary to make a test to measure the throughput in litres.

When ordering extra oil nozzles please state the nozzle type.

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6.0 Spare parts.

AAI-M Spare Parts

Spare parts list for oilburner

8			
7	1	Contactor for burner motor	
6	1	Control box	L&G type LOK 16
5	1	Pressure gauge	
4	1	Photo cell	Type RAR 7
3	2	Ignition electrode	
2	1	Nozzle head	
1	1	Oil nozzle	type W 160
Item	No. of	Name of parts	Drawing/Item
		SPARE PARTS LIST **ORDER NO.**	Data sheet Page 1 of 1

AALBORG INDUSTRIES

P O Box 661, Gasvaerksvej 24
9100 Aalborg, Denmark
Tel.: +45 99 30 40 00
Fax: +45 98 16 30 22
E-mail: aalg@aalborg-industries.dk
http://www.aalborg-industries.com

Ersatzteile für Weishaupt Brenner Größen 5 bis 11

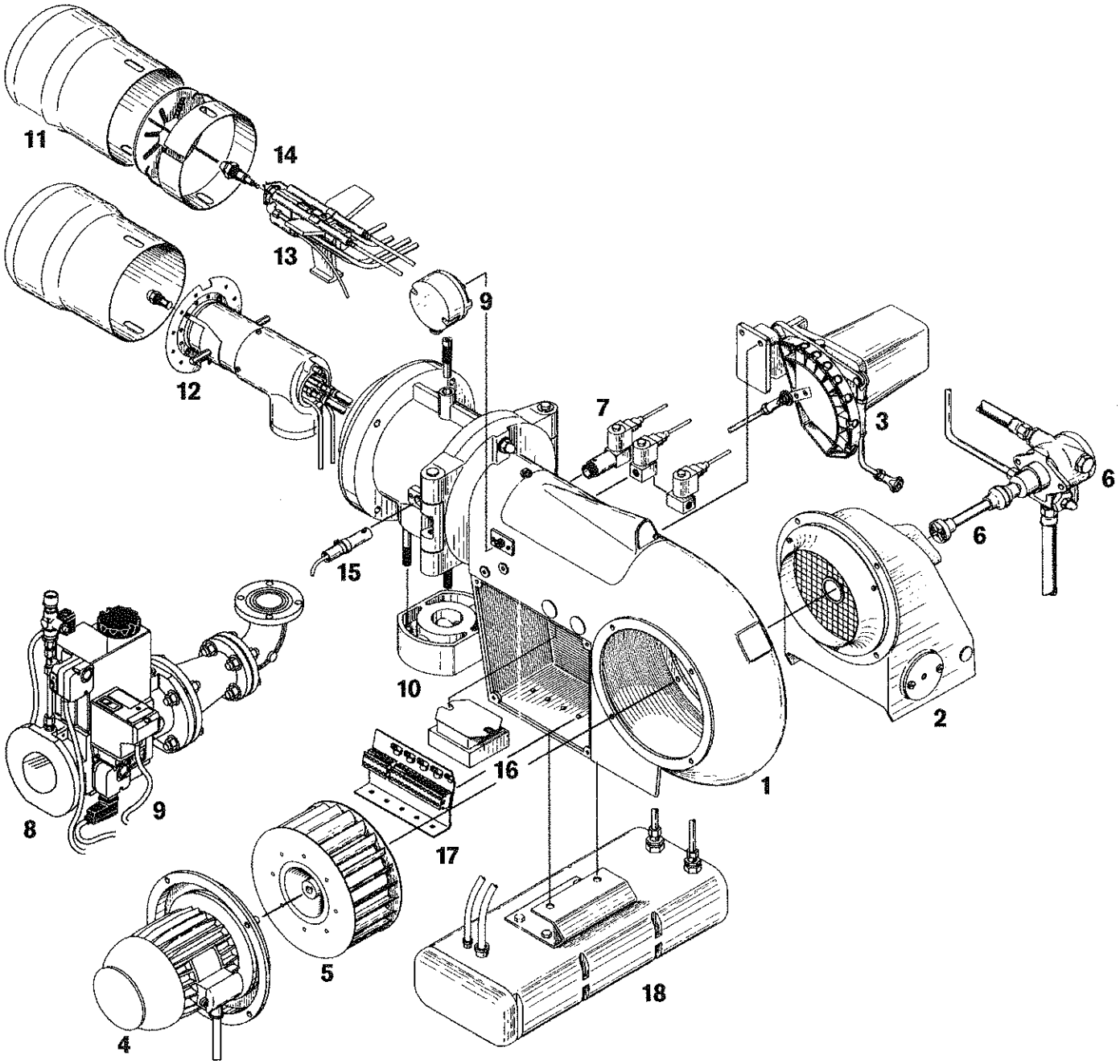
Spare parts for Weishaupt burner Sizes 5 to 11

Pièces de rechange pour brûleurs types Grandeurs 5 à 11

AALBORG INDUSTRIES

P O Box 845, Gasvaerksvej 24
9100 Aalborg, Denmark
Tel.: +45 99 30 40 00
Fax: +45 98 10 13 30
E-mail: aall@aalborg-industries.dk
http://www.aalborg-industries.com

Sachgruppe / Subject Index / Famille



Bitte geben sie in der Bestellung an:

- Bezeichnung des Ersatzteiles
- Bestellnummer
- **Brennertyp**
- **Fabriknummer**

Bitte beachten Sie in Verbindung mit Bestell-Nr. und Preis:
E = Ersatzteil
Z = Zubehörteil

Kindly indicate in the order:

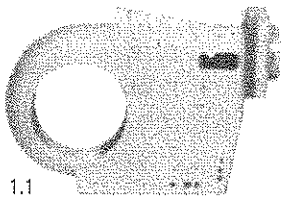
- Designation of the spare part
- Order-No.
- **Burner type**
- **Manufacturing-No.**

In connection with ordering number and price, please note:
E = Spare part
Z = Accessory

Indiquer également:

- Désignation de la pièce
- No de référence
- **Type brûleur**
- **No de fabrication**

Attention: bien faire la différence pour chaque numéro de référence
E = Pièces détachées
Z = Accessoires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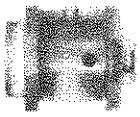
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Bild Pict. Photo	**Bezeichnung** Brenner-Typenreihe Burner serie Type brûleur		Größe Size Grand.	Bestell-Nr. Order-No. No de commande			ca. kg appr. kg env. kg	**Designation**	**Désignation**
1.	**Brennergehäuse und Einzelteile**							**Burner casing and individual parts**	**Carcasse Brûleur et pièces détachées**
	Brennergehäuse							**Burner casing**	**Carcasse de brûleur**
1.1	L, M, RL		5	111 552 0103/2	E		13,850		
	L, MS, RL, RMS,		7 + 8	111 652 0103/2	E		20,780		
	L, MS, RL, RMS		8/2	111 862 0102/2	E		20,400		
	L, MS, RL, RMS		9 + 10	111 974 0104/2	E		31,880		
	RL, RMS		11	181 174 0102/2	E		48,000		
	G, GL, RGL		5	151 518 0104/2	E		10,600		
	G, GL, RGL		7 + 8	151 707 0104/2	E		15,600		
	G, GL, RGL		9 - 11	151 907 0104/2	E		28,800		
1.2	**Ansaugluftführung** (o. Bild)		5 LN	111 564 0102/7	E			**Inlet nozzle** (without picture)	**Couronne aspiration** (sans photo)
	Schwenkflansch	Ø mm						**Swivel flange**	**Bride à charnière**
1.3	L, M, RL	140	5	111 552 0102/7	E		1,650		
	L	151	5 LN	111 564 0102/7	E		1,450		
	L, MS, RL, RMS,	180	7 + 8	111 652 0102/7	E		2,780		
	L, MS, RL, RMS	220	8/2	111 862 0101/7	E		5,160		
	L, MS, RL, RMS	275	9 + 10	111 974 0102/7	E		3,880		
	RL, RMS	340	11	181 174 0102/7	E		5,900		
1.4	G, GL, RGL	180	5	151 518 0105/7	E		6,600		
	G, GL, RGL	220	7 + 8	151 707 0103/7	E		7,400		
	G, GL, RGL	280	9 + 10	151 907 0101/7	E		4,000		
	G, RGL	326	11	191 107 0101/7	E		13,900		
	Klemmschraube							**Locking screw**	**Bouchon hexagonal**
1.5	G, GL, RGL		5	151 518 0107/7	E		0,048		
	G, GL, RGL		7 +8	151 707 0105/7	E		0,050		
	G, GL, RGL (G7-NA)		9 +10	151 907 0110/7	E		0,066		
	G, RGL		11	161 308 1499/7	E		0,075		
	Flammkopfhalter							**Intermediate ring** for swivel flange	**Bague intermédiaire** pour bride à charnière
1.6	L, MS, RL, RMS		9	111 974 0103/7	E		2,820		
	RL, RMS		10	181 074 0101/7	E		2,300		
	RL, RMS		11	181 174 0103/7	E		5,700		
	Flanschdichtung	Ø mm						**Flange sealing**	**Joint**
1.7	L, M, RL	160 x 242	5	111 552 0012/7	E		0,218		
	L, MS, RL, RMS	202 x 280	7 + 8	111 652 0012/7	E		0,225		
	L, MS, RL, RMS	255 x 350	8/2	121 262 0003/7	E		0,387		
	L, MS, RL, RMS	302 x 380	9 + 10	111 974 0007/7	E		0,313		
	RL, RMS	450 x 341	11	181 174 0003/7	E		0,573		
	G, GL, RGL	202 x 260	5	111 612 0010/7	E		0,189		
	G, GL, RGL	255 x 330	7 + 8	151 707 0005/7	E		0,287		
	G, GL, RGL	302 x 380	9 + 10	111 974 0007/7	E		0,313		
	G, RGL	450 x 341	11	191 107 0003/7	E		0,586		
	Schwenkbolzen							**Swivel bolt**	**Axe de charnière**
1.8	L, MS, RL, RMS, G, GL, RGL		5-8	111 652 0104/7	E		0,243		
	L, MS, RL, RMS, G, GL, RGL		9-11	111 974 0105/7	E		0,462		
1.9	**Schalter** mit Stoßbolzen			700 903	E		0,024	**Switch** with push bolt	**Interrupteur** de fin de course
1.10	**Stopfen** für Brennergehäuse							**Closing plug** for burner	**Bouchon obturateur**
	für Bohrung	Ø 14,7		111 151 0004/7	E		0,001		
		rot Ø 15,6		452 873	Z		0,001		
		schwarz Ø 15,6		446 001	Z		0,001		
		Ø 18,4		452 847	Z		0,001		
		Ø 20,0		111 151 0008/7	E		0,002		
		Ø 20,7		446 004	Z		0,001		
		Ø 6,5		111 011 0115/7	E		0,001		
	für	Ø 6,9		111 512 0007/7	E		0,001		
	Verschraubung	G 1/8"		452 859	Z		0,001		
	Schaurohrdeckel mit Schauglas							**Inspection tube cover** complete with sight glass	**Couvercle d'inspection** complet avec visière
1.11	L, M, RL, G, GL, RGL		5	111 552 0102/2	E		0,691		
	L, MS, RL, RMS, G, GL, RGL		7 + 8	111 652 0102/2	E		0,793		
	L, MS, RL, RMS, G, GL, RGL		9-11	111 974 0102/2	E		1,480		
1.12	**Schauglas** für Schaurohrdeckel			111 151 0109/7	E		0,004	**Clear sight glass** for inspection tube cover	**Verre de visière** pour couvercle d'inspection
1.13	**Abdeckblech**			111 311 0111/7	E		0,020	**Cover sheet** for	**Plaquette cache visière**

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Bild Pict. Photo	**Bezeichnung** Brenner-Typenreihe Burner serie Type brûleur	Größe Size Grand.	Bestell-Nr. Order-No. No de commande			ca. kg appr. kg env. kg	**Designation**	**Désignation**
	Verschlußdeckel für Brennergehäuse						**Closing cover** for burner casing	**Plaque de fermeture** pour carcasse de brûleur
1.14	L (zweistufig)	5-10	111 361 0004/2	E		0,040	two stage	deux allures
1.15	RL, M, MS, RMS	5-11	112 361 0005/2	E		0,040		
	GL	5-9	155 327 0002/2	E		0,100		
	RGL	8-11	112 361 0005/2	E		0,040		
1.16	G	5-11	251 303 0107/7	E		0,045		
	RGL (o. Bild)	5-7	156 327 0001/2	E		0,045	(without picture)	(sans photo)
1.17	**Blinddeckel** 1 x 40 x 60 (Gas)	5-11	151 518 0108/7	E		0,019	**Cover**	**Plaque pour carcasse**
	Tülle für Brennergehäuse						**Transition nipple** for burner casing	**Joint de passage** pour carcasse de brûleur
1.18	L, M, MS, RL, RMS, GL, RGL	5-11	111 351 0004/7	E		0,002		
1.19	L, GL	5-9	111 351 0005/7	E		0,002		
1.20	L, GL	5-9	111 351 0006/7	E		0,004		
1.21	M, MS, RL, RMS, RGL	5-11	112 351 0010/7	E		0,004		
	Luftleitblech						**Sheet metal air deflector**	**Tôle de guidage d'air**
1.22	L, M, RL, G, GL, RGL	5	111 552 0009/7	E		0,084		
		7+8	111 652 0008/7	E		0,097		

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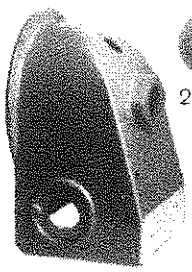
2.2-2.4



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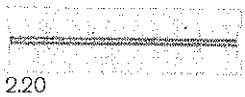

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Bild Pict. Photo	Bezeichnung Brenner-Typenreihe Burner serie Type brûleur	Größe Size Grand.	Bestell-Nr. Order-No. No de commande		ca. kg appr. kg env. kg	Designation	Désignation
2.	**Luftregelung**					**Air regulation**	**Regulation d'air**
	Luftregler komplett **zwei- und dreistufige Brenner**					**Air regulation complete,** **two and three stage burners**	**Régulation d'air complète** **brûleurs deux et trois allures**
2.1	L, M	5	111 564 0401/0	E	5,480		
	L	5 LN	111 564 0403/0	E	5,500		
	L, MS,	7+8/2	111 764 0401/0	E	6,317		
	L, MS,	9+10	111 964 0402/0	E	9,634		
	L	7T+8T	111 794 0402/0	E	6,402		
	L	9T+10T	111 994 0401/0	E	11,500		
2.2	G	5	151 518 0202/0	E	4,510		
	G	7 + 8	151 716 0202/0	E	5,000		
	GL	5	155 518 0201/0	E	4,560		
	GL	7 + 8	155 716 0202/0	E	5,264		
	gleitend-zweistufige Brenner					**sliding two stage burners**	**brûleurs deux allures progressives**
2.3	RL	5	111 582 0202/0	E	4,380		
	RL, RMS	7-8/2	111 782 0203/0	E	5,141		
	RL, RMS	9-11	111 974 0202/0	E	8,420		
2.4	G	5	151 518 0203/0	E	4,578		
	G	7 + 8	151 707 0201/0	E	4,650		
	G	9-11	151 907 0201/0	E	8,239		
	G, Ausf. ZMI	5	151 518 0204/0	E	4,500		
	G, Ausf. ZMI	7-8	151 707 0203/0	E	6,500		
	GL, RGL	5	155 518 0202/0	E	5,190		
	GL, RGL	7 + 8	155 707 0201/0	E	5,010		
	GL, RGL	9-11	156 907 0201/0	E	8,226		
	Luftregelgehäuse					**Air regulation casing**	**Carcasse de régulation d'air**
2.5	L, M, RL, G, GL, RGL	5	111 552 0201/7	E	3,350		
	L, MS, RL, RMS, G, GL, RGL	7 + 8	111 762 0402/7	E	3,900		
	L, MS, RL, RMS, G, GL, RGL	9 -11	111 974 0207/7	E	6,200		
2.6	**Auskleidung**	5 LN	111 564 0203/7	E		**Lining**	**Isolement**
2.7	**Haltegitter**	5 LN	111 564 0201/7	E		**Supporting grating**	**Grille**
2.8	**Luftleitblech**	5 LN	111 564 0204/7	E		**Air guiding sheet**	
2.9	**Haltebolzen**	5 LN	111 564 0202/7	E		**Supporting bolt**	**Support**
2.10	**Federmutter**	5 LN	412 506	Z		**Spring nut**	**Disque**
	Verschlußdeckel					**Closing cover**	**Couvercle**
2.11	L, MS, RL, RMS, G, GL, RGL	9 -11	111 974 0208/7	E	0,155		
	Ansauggitter					**Air intake protection**	**Grille de protection**
2.12	L, M, RL, G, GL, RGL	5	111 574 0201/2	E	0,062		
	L, MS, RL, RMS, G, GL, RGL	7+8/2	111 774 0201/2	E	0,070		
	L, MS, RL, RMS, G, GL, RGL	9 -11	111 974 0107/2	E	0,138		
	Einlaufdüse					**Inlet nozzle**	**Couronne d'aspiration**
2.13	L, M, RL, G, GL, RGL	5	111 552 0206/7	E	0,145		
	L, MS, RL, RMS, G, GL, RGL	7+8/2	111 762 0410/7	E	0,992		
	L, MS, RL, RMS, G, GL, RGL	9-11	111 974 0107/7	E	0,992		
2.14	**Abdeckblech** mit Lagerbuchse	5-11	111 652 0204/2	E	0,170	**Sheet cover**	**Tôle protectrice**
		7-8/2(T)	111 794 0402/2	E	0,166		
	Stopfen Ø mm					**Closing plug**	**Bouchon**
2.15	L, M, MS, RL, RMS, G, GL 15,6	5-11	452 873	Z	0,001		
	L, MS, RL, RMS, G, GL, RGL 35,0	5-8	111 011 0207/7	E	0,008		
	L, MS, RL, RMS, G, GL, RGL 20,0	9 + 10	111 151 0008/7	E	0,002		
	G (Pumpenöffnung) 55,0	5 -11	452 854	Z	0,020		
	Luftklappe Abmessung mm					**Air flap**	**Clapet d'air**
2.16	L,M,RL,G,GL,RGL 128 x 226	5 (LN)	111 562 0403/2	E	0,159		
2.17	L,M,RL,G,GL,RGL 60 x 227	5	111 562 0404/2	E	0,056		
2.18	L,MS,RL,RMS,G,GL,RGL 150 x 240	7 + 8	111 762 0409/2	E	0,183		
2.19	L,MS,RL,RMS,G,GL,RGL 64 x 240	7 + 8	111 762 0408/2	E	0,063		
2.20	L,MS,RL,RMS,G,GL,RGL 107 x 370	9-11	111 974 0203/2	E	0,576		
2.21	**Luftklappenwelle** Länge **zwei- und dreistufige Brenner**					**Air flap shaft** **two and three stage burners**	**Axe clapet d'air** **brûleurs deux et trois allures**
	L 8 x 283,0	5 LN	111 562 0406/7	E	0,110		
	L, M 8 x 296,0	5	111 564 0401/7	E	0,112		
	L, G, GL 6 x 261,5	5	111 582 0206/7	E	0,068		
	G, GL, RL 8 x 289,0	5	111 582 0221/7	E	0,128		
	G, GL	7 - 8/2	111 782 0206/7	E	0,130		
	G, GL, L, MS 6 x 274,0	7 - 8/2	111 782 0203/7	E	0,072		
	L, MS 8 x 308,0	7 - 8/2	111 764 0401/7	E	0,141		
	L, MS 8 x 450,0	9 + 10	111 964 0402/7	E	0,209		
	L, MS 8 x 424,0	9-10T	111 974 0210/7	E	0,190		

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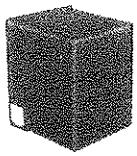
2.38 2.39 2.40

Bild Pict. Photo	Bezeichnung Brenner-Typenreihe Burner serie Type brûleur	Größe Size Grand.	Bestell-Nr. Order-No. No de commande			ca. kg appr. kg env. kg	Designation	Désignation
	gleitend-zweistufige Brenner						**sliding two stage burners**	**brûleurs deux allures progressives**
	RL, G, GL, RGL 8 x 289,0	5	111 582 0221/7	E		0,128		
	RL, G, GL, RGL 6 x 261,5	5	111 582 0206/7	E		0,068		
	RL, GL, RGL 6 x 274,0	7-8/2	111 782 0203/7	E		0,072		
	RL, RMS, G, GL, RGL 8 x 303,5	7 + 8	111 782 0206/7	E		0,135		
	RL, RMS, G, GL, RGL 8 x 424,0	9-11	111 974 0210/7	E		0,190		
	RL, RMS, G, GL, RGL 8 x 434,0	9-11	111 974 0213/7	E		0,192		
	Lagerschraube						**Bearing screw**	**Vis palier**
2.22	L, M, MS, G, GL, RGL, RL, RMS	5-8	111 582 0207/7	E		0,021		
	Lagerbuchse						**Bearing bush**	**Logement axe**
2.23	RL, RMS, G, GL, RGL	5-8	111 151 0204/7	E		0,010		
2.24	L, MS, RL, RMS, G, GL, RGL	9-11	111 974 0205/7	E		0,025		
	Nadelhülse						**Needle sleeve**	**Douille aiguille**
2.25	L, MS, RL, RMS, G, GL, RGL	9-11	460 027	E		0,011		
	Antriebshebel **zweistufige Brenner** (ohne Bild)						**Drive lever** **two stage burners** (without picture)	**Levier de mouvement** **brûleurs allures** (sans photo)
2.26	G, GL	5-8	151 518 0211/7	E		0,034		
	gleitend-zweistufige Brenner						**sliding two stage burners**	**brûleurs deux allures**
2.27	L, RL, RMS, G, GL, RGL 7,0 x 15	5-11	111 582 0216/7	E		0,022		
2.28	L, RL, RMS, G, GL, RGL 5,5 x 15	5-8	111 582 0217/7	E		0,025		**progressives**
2.29	RL, RMS, G, GL, RGL 5,5 x 15	5-8	111 582 0218/7	E		0,040		
2.30	RL, RMS, G, GL, RGL 7,0 x 15	9-11	111 582 0219/7	E		0,045		
	Verbindungsleiste						**Connection strip**	**Barette de jonction**
2.31	L, RL, G, GL, RGL	5	111 582 1504/7	E		0,039		
2.32	L, RL, RMS, G, GL, RGL	7 + 8	111 782 1503/7	E		0,045		
2.33	L, MS, RL, RMS, G, GL, RGL	9-11	111 974 1502/7	E		0,041		
	Lagerbolzen						**Bearing bolt**	**Vis tête plate**
2.34	L, RL, M, RMS, G, GL, RGL	5-11	111 582 0220/7	E		0,016		
2.35	**Grenztaster**	7-10T	111 794 0403/2	E		0,144	**Limit switch**	**Interrupteur**
2.36	**Schaltring**	7-10T	111 381 0201/7	E		0,027	**Contact ring**	**Came brûleur**
2.37	**Stellring** 18 x 35 x 11	7-10T	111 794 0402/7	E		0,023	**Adjusting ring**	**Rondelle gradué**
2.38	**Blech** 1,5 x 50 x 230 ZMI	5	151 518 0210/7	E		0,059	**Sheet**	**Tôle**
	1,5 x 62 x 242 ZMI	7-8	151 707 0204/7	E		0,060		
2.39	**Einstellknopf** mit Zeiger		211 153 0212/7	E		0,007	**Adjusting knob**	**Bouton**
2.40	**Ring** 10,2 x 17 x 6		211 153 0213/7	E		0,006	**Ring**	**Rondelle**
2.41	**Antriebshebel** Ausf. T 7 x 18 x 15	7-10	111 794 0403/7	E		0,021	**Drive lever**	**Levier de mouvement**



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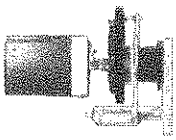

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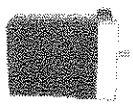

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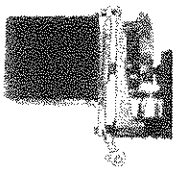
Bild Pict. Photo	**Bezeichnung** Brenner-Typenreihe Burner serie Type brûleur	Größe Size Grand.	Bestell-Nr. Order-No. No de commande		ca. kg appr. kg env. kg	**Designation**	**Désignation**
3.	**Stellantrieb f. Ölbrenner**					**Servo drive for oil burners**	**Servo-moteur pour bruleur fuel**
	zweistufige Brenner					**two stage burners**	**bruleurs deux allures**
3.1	**Stellantrieb 1055/23**					**Servo drive type 1051/23**	**Servo moteur type 1051/23**
	110V 50 Hz		110 500 0009/2	E	1,140		
	110V 60 Hz		110 500 0010/2	E	1,131		
	230V 50 Hz		110 500 0011/2	E	1,183		
	230V 60 Hz		110 500 0012/2	E	1,185		
3.2	**Stellantrieb 1055/80**					**Servo drive**	**Servo moteur**
	110V 50-60 Hz		110 500 0013/2	E	1,125	**type 1051/80**	**type 1051/80**
	230V 50-60 Hz		110 500 0014/2	E	1,195		
3.3	**Abdeckhaube** 1055/23, 1055/80		651 399	E	0,140	**Cover**	**Capot**
	SQM10		651 428	E	0,267		
	gleitend-zweistufige Brenner					**sliding two stage burners progressives**	**brûleurs deux allures**
3.4	**Stellantrieb SQM10, komplett**					**Regulating drive SQM10,**	**Organe de réglage**
	RL	5	111 574 1501/0	E	6,969	**complete**	**SQM10, complet**
	RL	7	111 774 1501/0	E	6,984		
	RL	8	111 782 1503/0	E	7,300		
	RL	9 + 10	111 974 1503/0	E	6,840		
	RL	11	181 174 1502/0	E	7,000		
	RMS	7-8/2	112 774 1501/0	E	6,940		
	RMS	9/10	112 974 1501/0	E	6,964		
	RMS	11	182 174 1501/0	E	6,964		
3.5	**Stellantrieb SQM10**					**Servo drive SQM10**	**Servo-moteur SQM10**
	220-240 V/50-60 Hz (42 Sek. Laufzeit)		651 418	E	1,700		
	110 V/50-60 Hz (42 Sek. Laufzeit)		651 417	E	1,700		
	220-240 V/50-60 Hz (mit 20 Sek. Laufzeit)		651 422	E	1,700		
	110 V/50-60 Hz (mit 20 Sek. Laufzeit)		651 423	E	1,700		
3.6	**Heizpatrone** 20 W (o. Bild)					**Heating cartridge**	**Cartouche chauffante**
	RMS	7-11	112 381 1302/2	E	0,124		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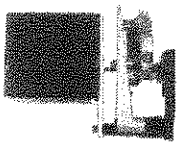
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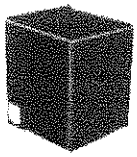
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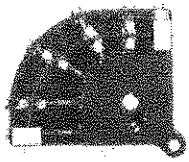
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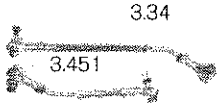
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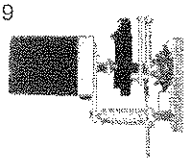
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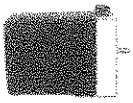
Bild Pict. Photo	Bezeichnung Brenner-Typenreihe Burner serie Type brûleur	Größe Size Grand.	Bestell-Nr. Order-No. No de commande			ca. kg appr. kg env. kg	Designation	Désignation
3.30	**Stellantrieb für Gas- und Zweistoffbrenner** **mit Regelgestänge für zweistufige Brenner**						**Servo-drive for gas and dual fuel burners** **with regulating rod for two stage burners**	**Servo-monteur pour brûleurs gaz et mixtes** **avec tige de réglage pour brûleurs 2 allures**
	Stellantrieb Typ 1055/80 komplett						**Servo drive Type 1051/80, complete**	**Servo-moteur Type 1051/80, complète**
3.31	G	5	151 516 1502/0	E		3,445		
	G	7-8	151 716 1502/0	E		3,470		
	GL	5	155 516 1502/0	E		3,343		
	GL	7-8	155 716 1502/0	E		3,370		
	ohne Regelgestänge für zweistufige Brenner Stellantrieb Typ 1055/80						**without regulating rod for two stage burners Servo drive Type 1051/80**	**sans tige de réglage pour brûleurs 2 allures Servo moteur Type 1051/80**
3.32	G, GL	5-8	151 101 1504/2	E		2,926		
3.33	**Stellantrieb Typ 1055/80**						**Servo drive type 1051/80**	**Servo moteur type 1051/80**
	110V 50-60 Hz	5-8	110 500 0013/2	E		1,125		
	230V 50-60 Hz	5-8	110 500 0014/2	E		1,195		
3.34	**Abdeckhaube** für Typ 1055/80		651 399	E		0,139	**Cover**	**Capot**
	für Typ SQM10		651 428	E		0,267		
3.35	**Reglerscheibe**	5-8	151 101 1506/2	E		0,390	**Control segment**	**Disque de réglage**
3.36	**Stahlband**	5-8	151 101 1528/7	E		0,012	**Steel band**	**Lame d'acier**
3.37	**Führungsstück**	5-11	211 373 1514/7	E		0,023	**Guide piece**	**Butée guide**
3.38	**Befestigungsstück**	5-8	151 101 1515/7	E		0,010	**Attachment piece**	**Butée de fixation**
3.39	**Federscheibe**	5-8	431 615	Z		0,001	**Spring plate**	**Disque à ressort**
3.40	**Platte** (o. Bild)		151 101 1505/2	E		0,402	**Plate**	**Plaque**
3.41	**Reglerhebel**		151 101 1507/2	E		0,117	**Regulating lever**	**Levier de réglage**
3.42	**Sicherungsring** A 10 x 1		435 424	Z		0,001	**Grip screw**	**Rondelle ressort**
3.43	**Welle** 8 x 8 x 105		151 101 1514/7	E		0,046	**Shaft**	**Bouchon**
	Anschlußkabel (ohne Bild)						**Connection cable** (without picture)	**Cable de raccordement** (sans photo)
3.44	9 x 0,75 x 810	1-8	151 101 1514/2	E		0,075		
	9 x 0,75 x 920	9-11	211 163 1504/2	E		0,120		
	Regelgestänge Luft						**Regulating rod, air**	**Tige de réglage, air**
3.45	G, GL	5	151 516 1501/2	E		0,231		
	G, GL	7-8	151 716 1502/2	E		0,258		
3.451	**Regelgestänge Gas**							
	G,GL	5	151 516 1502/2	E		0,250	**Regulating rod, gas**	**Tige de réglage, gaz**
	G, GL	7-8	151 716 1503/2	E		0,260		
	Gewindestange						**Threaded rod**	**Axe filetée**
3.46	M6 x 103	5	151 101 1511/7	E		0,019		
	M6 x 143	7-8	151 101 1512/7	E		0,028		
3.47	**Gelenkkopf** SFEV6		499 001	E		0,025	**Hinge rod head**	**Rotule d'accouplement**
3.48	**Bundbolzen** M6 x 63,0		151 101 1510/7	E		0,027	**Flange bolt**	**Goujon filetée**
	M6 x 32,5		151 327 1507/7	E		0,012		
	mit Regelgestänge für gleitend-zweistufige Brenner						**with regulating rod for sliding-two stage burners**	**avec tige de réglage pour brûleur progressif**
	Stellantrieb Typ SQM10						**Servo drive Type SQM10**	**Servo moteur Type SQM10**
3.49	G, GL	5	151 518 1504/0	E		4,826		
	G, GL	7-8	151 707 1503/0	E		4,888		
	G, GL	9-11	151 907 1503/0	E		5,378		
	RGL	5	156 518 1502/0	E		9,323		
	RGL	7	156 707 1503/0	E		9,334		
	RGL	8	156 807 1501/0	E		8,711		
	RGL	9 + 10	156 907 1502/0	E		8,735		
	RGL	11	196 107 1502/0	E		8,759		
	RGMS	7-8	158 707 1501/0	E		8,835		
	RGMS	9-10	158 907 1501/0	E		8,859		
	RGMS	11	198 107 1501/0	E		8,883		
	G (Ausf. ZM)	5	151 518 1505/0	E		4,592		
	G (Ausf. ZM)	7	151 707 1505/0	E		4,638		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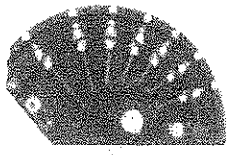
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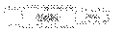
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Bild Pict. Photo	**Bezeichnung** Brenner-Typenreihe Burner serie Type brûleur	Größe Size Grand.	Bestell-Nr. Order-No. No de commande		ca. kg appr. kg env. kg	**Designation**	**Désignation**
	ohne Regelgestänge für gleitend-zweistufige Brenner (o. Bild)					**without regulating rod for sliding two stage burners**	**sans tige de réglage pour brûleur progressif**
3.50	G, GL Laufzeit 42 sek.	5-11	151 327 1510/2	E	4,408	(without picture)	(sans photo)
	G, GL Laufzeit 20 sek.	5-11	151 327 1518/2	E	4,408		
	RGL	5	156 518 1508/2	E	8,884		
	RGL	7	156 707 1504/2	E	9,000		
	RGL	8-10	156 807 1501/2	E	8,259		
	RGL	11	196 107 1502/2	E	8,263		
	Stellantrieb Typ SQM10					**Servo drive Type SQM10**	**Servo moteur Type SQM10**
3.51	220 -240V/50-60 Hz (42 Sek. Laufzeit)		651 418	E	1,700		
	110 V/50-60 Hz (42 Sek. Laufzeit)		651 417	E	1,700		
	220 -240V/50-60 Hz (mit 20 Sek. Laufzeit)		651 422	E	1,700		
	110 V/50-60 Hz (mit 20 Sek. Laufzeit)		651 423	E	1,700		
3.52	**Grundplatte**	5-11	151 327 1522/7	E	0,365	**Base plate**	**Plaque de base**
3.53	**Nabe** G	5-11				**Hub**	**Moyeu**
	GL	5-9	151 327 1511/2	E	0,108		
3.54	**Ölregler** bis 70 kg/h Welle 00/0	5	111 574 1501/2	E	2,370	**Oil regulator**	**Régulateur fuel**
	RGL, RGMS bis 280 kg/h 1/2	7	111 774 1501/2	E	2,360		
	bis 280 kg/h 1/2	8-10	111 874 1501/2	E	2,380		
	bis 420 kg/h 3/4	10-11	181 174 1504/2	E	2,400		
	ab 420 kg/h 4/5	11	211 604 1502/2	E	2,500		
3.55	**Heizpatrone** 20 Watt (o. Bild)	7-11	112 381 1302/2	E	0,124	**Heating cartridge**	**Cartouche chauffante**
3.56	**Dichtung**		443 117	Z	0,002	**Lip ring**	**Joint à lèvre**
3.57	**O-Ring** 42 x 2 (o. Bild)		445 034	Z	0,002	**O-Ring**	**Joint torique**
	Reglerscheibe					**Control segment**	**Disque de réglage**
3.58	G	5-11					
	GL	5-9	151 327 1506/2	E	0,930		
	RL, RGL, RMS	5-11	121 362 2103/2	E	0,730		
3.59	**Führungsstück**	5-11	211 373 1514/7	E	0,023	**Guide piece**	**Butée guide**
3.60	**Sicherungsscheibe**		431 601	Z	0,001	**Locking washer**	**Circlips**
	Verstellspindel M6/So.					**Adjusting spindle**	**Vis de réglage**
3.61	50 lang		121 362 2178/7	E	0,011		
	55 lang		121 362 2179/7	E	0,012		
	60 lang		121 362 2180/7	E	0,013		
	65 lang		121 362 2181/7	E	0,014		
	75 lang		121 362 2182/7	E	0,016		
3.62	**Führungswinkel**		121 362 2185/7	E	0,017	**Angular guide piece**	**Equerre de réglage**
3.63	**Stahlband**		121 362 2195/7	E	0,021	**Steel band**	**Lame d'acier**
3.64	**Paßscheibe**		121 362 2187/7	E	0,001	**Shim**	**Rondelle plate**
3.65	**Befestigungswinkel**		121 362 2184/7	E	0,009	**Attachment angle**	**Equerre de fixation**
3.66	**Hebel**		151 327 1517/7	E	0,030	**Lever**	**Levier**
3.67	**Schraubbolzen**		121 464 2114/7	E	0,006	**Screwing bolt**	**Boulon**
3.68	**Kupplungsstück**		151 327 1527/7	E	0,085	**Coupling piece**	**Accouplement**
3.69	**Platte**		151 327 1525/7	E	0,208	**Plate**	**Plaque**
3.70	**Welle** 66 mm (G, GL)		151 327 1526/7	E	0,081	**Shaft**	**Bouchon**
	66 mm (RGL, RGMS)		156 327 1507/7	E	0,080		
	142 mm		151 327 1528/7	E	0,082		
	212 mm		156 327 1504/7	E	0,123		
	Scheibenfeder					**Woodruff key**	**Rondelle**
3.71	5 x 6,5		490 151	Z	0,003		
	3 x 3,7		490 157	Z	0,001		

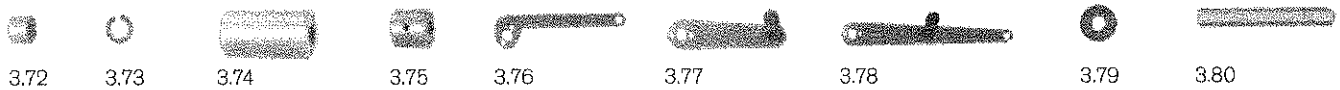

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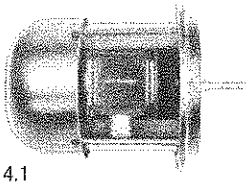
Bild Pict. Photo	Bezeichnung Brenner-Typenreihe Burner serie Type brûleur	Größe Size Grand.	Bestell-Nr. Order-No. No de commande		ca. kg appr. kg env. kg	Designation	Désignation
3.72	**Buchse**		121 464 2112/7	E	0,001	**Sleeve**	**Coussinet**
3.73	**Gleitlager**		499 089	E	0,005	**Bearing**	**Axe**
3.74	**Lagerbuchse**		151 327 1512/2	E	0,098	**Bearing sleeve**	**Axe coussinet**
3.75	**Buchse**		156 327 1505/7	E	0,048	**Sleeve**	**Coussinet**
3.76	**Hebel** 127 mm		156 327 1506/7	E	0,086	**Lever**	**Levier**
3.77	**Reglerhebel**		211 373 1515/2	E	0,143	**Regulating lever**	**Levier de réglage**
3.78	**Reglerhebel**		151 518 1507/2	E	0,194	**Regulating lever**	**Levier de réglage**
3.79	**Stellring**		151 327 1532/7	E	0,013	**Adjusting ring**	**Rondelle gradué**
3.80	**Stehbolzen** M8 x 134 M8 x 204		151 327 1524/7 156 327 1503/7	E E	0,238 0,327	**Stay bolt**	**Entretoise**
3.81	**Leiste**		151 327 1533/7	E	0,060	**Strip**	**Bornier**
	Regelgestänge (Luft)					**Regulating rod (air)**	**Tige de réglage (air)**
3.82	G, GL, RL, RGL	5	151 518 1508/2	E	0,120		
	G, GL, RL, RGL	7-8	151 707 1503/2	E	0,135		
	G, GL, RL, RGL	9-11	151 907 1505/2	E	0,139		
	Regelgestänge (Gas)					**Regulating rod (gas)**	**Tige de réglage (gaz)**
3.83	G, GL	5	151 518 1509/2	E	0,166		
	G, GL	7-8	151 707 1504/2	E	0,180		
	G, GL	9-11	151 907 1506/2	E	0,174		
	RGL	5	156 518 1507/2	E	0,120		
	RGL	7-10	156 707 1503/2	E	0,118		
	RGL	11	196 107 1503/2	E	0,138		
	Gewindestange (Luft u. Gas)					**Threaded rod (air and gas)**	**Tige de réglage (air et gaz)**
3.84	M6 x 115		111 582 1506/7	E	0,022		
	M6 x 240		111 974 1508/7	E	0,042		
	M6 x 283		151 516 1501/7	E	0,058		
	M6 x 200		196 107 1501/7	E	0,036		
3.85	**Gelenkkopf SFEV6** (Bild s. Seite7)		499 001	E	0,025	**Hinge rod head**	**Rotule d'accouplement**
3.86	**Distanzrohr** 6,1 x 10 x 4 6,2 x 8 x 28		151 101 1520/7 151 327 1535/7	E E	0,001 0,005	**Distance sleeve**	**Entretoise**
3.87	**Lagerbolzen**		151 327 1508/7	E	0,008	**Bearing bolt**	**Axe à galet**
3.88	**Anschlußkabel** 9 x 0,75 x 810 (ohne Bild) 12 x 0,75 x 980		151 101 1514/2 151 907 1502/2	E E	0,075 0,164	**Connection cable** (without picture)	**Câble raccordement** (sans photo)
3.89	**Verschraubung** PG11 x 6-9 PG11 x 6-11		730 009 730 110	E E	0,018 0,016	**Screwing**	**Presse étoupe**
3.90	**Potentiometer** (ohne Bild)					**Positions indicator**	**Indicateur de position**
	ASZ8 220 Ohm		651 434	Z	0,027		
	ASZ12 1000 Ohm		651 435	Z	0,027		



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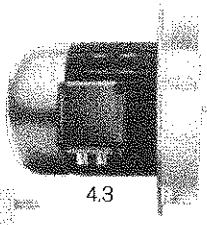

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Bild Pict. Photo	Bezeichnung Brenner-Typenreihe Burner serie Type brûleur		Größe Size Grand.	Bestell-Nr. Order-No. No de commande			ca. kg appr. kg env. kg	Designation	Désignation
4.	**Brennermotor**							**Burner motor**	**Moteur de brûleur**
	Bei Bestellung Spannung und Frequenz angeben.							When ordering indicate voltage and frequency	A la commande indiquer la tension et la fréquence
	Brennermotoren, 50 Hz, 2800 1/min.							**Burner motor**	**Moteur de brûleurs**
	Typ	V							
4.1	DK08/90-2/3	230/400	5	111 554 0763/0	E		11,140		
4.2	DK2-2	230/400	7	111 762 0714/0	E		25,120		
	DK3/115-2	230/400	8/2	111 866 0704/0	E		33,520		
	DK3/115-2a	230/400	8	111 862 0711/0	E		34,060		
	DK3/115-2a	380/660	8	111 862 0729/0	E		34,020		
	DK3/115-2	380/660	8/2	111 866 0717/0	E		34,060		
4.3	D132/120-2a	380/660	9	111 974 0715/0	E		44,500		
	D132/120-2	380/660	10	181 074 0721/0	E		45,500		
	D132/150-2	380/660	11	181 174 0716/0	E		54,000		
	Zwischenring							**Intermediate ring**	**Bride intermédiaire**
4.4	L, MS, RL, RMS, G, GL, RGL		5	111 552 0103/7	E		1,015		
	L		5 LN	111 564 0103/7	E		1,020		
4.5	**Scheibenfeder**	5 x 6,5	5	490 151	Z		0,003	**Woodruff key**	**Clavette disque**
4.6	**Paßfeder**	6 x 6 x 45	7-8/2	490 316	Z		0,012	**Adjusting spring**	**Clavette**
5.	**Gebläse**							**Blower**	**Ventilation**
	Gebläserad							**Blower wheel**	**Turbine**
	Ø mm	Farbe						Color	Couleur
5.1	248 x 100 36 Sch.	verzinkt	5	111 552 0804/2	E		1,957	galvanized	zinguée
	248 x 100 36 Sch.	rot (60 Hz)	5	111 552 0805/2	E		1,239	red	rouge
5.2	268 x 100 30 Sch.	verzinkt	7 + 8	111 612 0804/2	E		3,120		
	248 x 100 36 Sch.	rot (60 Hz)	7 + 8	111 612 0810/2	E		2,393	red	rouge
5.3	330 x 100 42 Sch.	grün	9	111 974 0814/2	E		5,002	green	verte
	330 x 100 42 Sch.	rot (60 Hz)	9	111 974 0815/2	E		3,877	red	rouge
5.4	345 x 100 38 Sch.	blau	10	211 504 0808/2	E		3,760	blue	bleue
	330 x 100 42 Sch.	rot (60 Hz)	10	111 974 0816/2	E		3,860	red	rouge
5.5	345 x 100 38 Sch.	blau	11	211 504 0808/2	E		3,760	blue	bleue
	330 x 100 42 Sch.	rot (60 Hz)	11	211 504 0810/2	E		3,760	red	rouge
	Abziehvorrichtung f. Gebläserad							**Blower wheel remover**	**Arrache turbine**
5.6			5-8	111 111 0001/2	E		0,194		
5.7			9-11	121 362 0013/2	E		0,687		
5.8	**Kupplungsstück** D132		9-11	111 974 0811/7	E		0,063	**Coupling piece**	**Pièce d'accouplement**
	Unterlegscheibe							**Washer** for blower wheel	**Rondelle plate** pour
5.9	für Gebläseradbefestigung		5	111 512 0803/7	E		0,005	attachment	fixation turbine
			7 + 8	111 612 0809/7	E		0,011		
5.10	**Schraube** M10 x 40 links		9-11	402 630	Z		0,032	**Screw**	**Vis**
5.11	**Sicherungsscheibe** S6		5	490 003	Z		0,001	**Spring plate**	**Disque à ressort**
5.12	**Schraube** M6 x 25		5	402 371	Z		0,007	**Screw**	**Vis**
	M8 x 20		7+8	404 408	Z		0,009		
5.13	**Fächerscheibe** (o. Bild) V8,4		7+8	431 704	Z		0,001	**Fan disc washer**	**Rondelle eventoil**
5.14	**Federring** (o. Bild) A10		9-11	435 301	Z		0,002	**Spring ring**	**Disque à ressort**

6.1-6.4

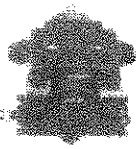

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Bild Pict. Photo	**Bezeichnung** Brenner-Typenreihe Burner serie Type brûleur		Größe Size Grand.	Bestell-Nr. Order-No. No de commande			ca. kg appr. kg env. kg	**Designation**	**Désignation**
6.	**Pumpen**							**Pumps**	**Pompes**
		Pumpentyp						Pump type	Pompe type
6.1	L, GL	**J6**	5	601 005	E		3,720		
6.2	L, GL	**AT265**	5 LN	601 617	E		3,500		
	L, GL	**J6**	7	601 005	E		3,720		
	L, GL	**J7**	8-9	601 006	E		3,900		
6.3	M,	**E4**	5	601 047	E		4,050		
	MS	**E6**	7	601 048	E		4,165		
	MS	**E7**	8-9	601 049	E		4,290		
6.4	RL, RGL	**E7**	5	601 049	E		4,290		
6.5	RL, RMS, RGL	**TA2**	7	601 050	E		5,470		
	RL, RMS, RGL	**TA3**	8-10	601 051	E		5,760		
	RL, RMS, RGL	**TA4**	11	601 052	E		6,040		
	Anschlußteile für Pumpe: (o. B.)							**Connection parts**	**Eléments de raccordement**
6.6	J6, J7	L	5-9	111 564 0602/2	E		0,190	for pump	pour pompe
	TA2	L	10T	181 094 0603/2	E		0,275		
	E4	M	5	112 564 0602/2	E		0,600		
	E6/E7	MS	7-9	112 764 0605/2	E		0,560		
	E7	RL, RGL	5	111 574 0602/2	E		0,605		
	TA2, TA3	RL, RMS	7-10	111 774 0603/2	E		0,590		
	TA4	RL, RMS	11	181 174 0602/2	E		0,720		
	TA2 (RL7 mit K3 Düse)			111 774 0604/2	E		0,608		
6.7	**Magnetspule** 185-254 V, 50-60Hz			604 429	E		0,080	**Solenoid valve coil**	**Bobine de vanne**
	Sieb (ohne Bild)							**Filter** (without picture)	**Filtre** (sans photo)
6.8	für Pumpe J3, J4, J6			601 066	E		0,015	for pump	pour pompe
	E4, E6, E7, J7			601 067	E		0,042		
6.9	**Deckeldichtung** J-H-E (o.Bild)			601 069	E		0,001	**Sealing** (without picture)	**Joint** (sans photo)
6.10	**Filtersatz Nr. 1**	AT 265		601 101	E		0,005	**Filter set**	**Filtre**
	Pumpenkupplung							**Pump coupling**	**Accouplement de pompe**
6.11	L, M, MS, GL		5-9						
	RL, RGL		5	111 011 0902/2	E		0,033		
	L		5 LN	111 151 0902/2	E		0,035		
	RL, RMS		7-11	111 782 0901/2	E		0,134		
	RGL		9-11	111 782 0901/2	E		0,134		
6.12	GL (mit Magnetkupplung), RGL		7 + 8	155 707 0902/7	E		0,095	(with magnet coupling)	(avec accouplement magnétique)
	Kupplungsmittelstück	Länge mm						**Coupling center piece**	**Accouplement intermediaire**
6.13	L,M,RL,GL,RGL	141	5	211 363 0903/2	E		0,150	Length mm	Longueur mm
	L	173	5 LN	211 363 0904/2	E		0,155		
	L,MS,RL,RMS,GL	188,5	7 + 8	111 764 0903/2	E		0,173		
	L,MS	208,5	9	111 964 0903/2	E		0,183		
	RL,RMS,GL,RGL	200	9-11	111 974 0901/2	E		0,181		
6.14	**Kupplungskreuz**, L,M,R,GL,RGL			111 151 0901/7	E		0,005	**Coupling cross**	**Croisillon**
6.15	**Befestigungsflansch**	RL, RMS	7 + 8					**Attachment flange**	**Flasque de fixation**
		GL mit J-Pumpe	7-9	111 882 0601/2	E		0,225		
6.16	**Pumpenflansch**		5 LN	111 564 0604/7	E			**Pump flange**	**Bride pour pompe**
6.17	**Steckerkabel**		5 LN	604 472	E			**Plug cable**	**Câblage**
6.20	**Pumpenheizung**							**Pump heating**	**Chauffage de pompe**
6.21	**Heizpatrone**	220 V/ 80 W (E)	5	112 151 0605/2	E		0,176	**Heating cartridge**	**Cartouche chauffante**
	komplett	220 V/ 80 W (E)	7-9	112 764 0604/2	E		0,210	complete	complet
		220 V/100 W (TA)	7-11	112 774 0603/2	E		0,213		
6.22	**Heizpatrone**	110 V/ 80 W		794 226	E		0,035	**Heating cartridge**	**Cartouche chauffante**
		110 V/100 W		794 228	E		0,035		
		220 V/ 80 W		794 227	E		0,035		
		220 V/100 W		794 229	E		0,035		
6.23	**Druckring** (ohne Bild)			122 364 1001/7	E		0,002	**Pressure ring**	**Bague de pression**
6.24	**Lackschlauch**, Preis pro Meter (ohne Bild)			750 754	E		0,018	**Varnishing hose**	**Gaine isolante**
6.25	**Verschraubung**, Pg 9			491 301	Z		0,014	**Screwing**	**Presse étoupe**
6.26	**Metallschlauch**, DN 9 Preis pro Meter			491 040	Z		0,026	**Metal hose**	**Gaine métallique**


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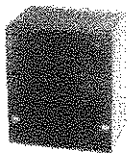
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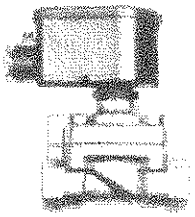
Bild Pict. Photo	Bezeichnung Brenner-Typenreihe Burner serie Type brûleur			Größe Size Grand.	Bestell-Nr. Order-No. No de commande			ca. kg appr. kg env. kg	Designation	Désignation
6.40	**Magnetkupplung**								**Magnet coupling**	**Accouplement magnétique**
	Magnetkupplung (Gleichstrom)								**Magnet coupling**	**Accouplement magnétique**
6.41	**WMK 1**		RGL	5	155 101 0903/2	E		0,615	(direct current)	(courant continu)
	WMK 2		GL	7-9	155 707 0902/2	E		1,100		
	WMK 2/1		RGL	7-11	155 907 0903/2	E		1,099		
	Lagerflansch								**Bearing flange**	
6.42	GL, RGL			5	155 518 0901/2	E		0,850		
	GL, RGL			7-8	155 707 0901/2	E		1,100		
	GL, RGL			9-11	155 907 0901/2	E		1,050		
	Haltescheibe								**Holding disk**	**Rondelle de maintien**
6.43	GL, RGL			5-11	155 101 0903/7	E		0,005		
	Distanzscheibe								**Distance shim**	**Entretoise**
6.44	GL, RGL			5	155 101 0904/7	E		0,011		
	Pumpenflansch								**Pump flange**	**Support de pompe**
6.45	GL, RGL			5	155 101 0601/7	E		0,555		
	GL, RGL			7-11	155 907 0601/7	E		0,723		
	Gleichrichtergerät								**Rectifier aggregate**	**Redresseur**
6.46	DG/2, 220 V - 240 V/24 V				710 565	E		1,810		
	DG/2, 110 V - 120 V/24 V				710 566	E		1,862		
6.47	**Abziehvorrichtung** WMK1, WMK2, WMK2/1			5-11	155 907 0002/2	E		0,210	**Remover**	**Arrache accouplement**
6.50	**Ölschläuche**								**Oil hoses**	**Flexibles fuel**
	Ölschläuche für Ölpumpe als Ansaug- und Rücklaufschlauch Für Heizöl EL bis max. 70°								**Oil hoses for oil pump as suction intake and return hose** For fuel oil EL up to max. 70°C	**Flexibles pour pompe aspiration et refoulement** Pour fuel EL max. 70°C
			DN	Länge mm					Lenght mm Connection	Longeur mm
6.51	L, GL	G 1/2	13	1000	5-9	491 019	E	0,476		
	L, GL	G 1/2	13	1300	5-9	491 031	E	0,647		
	L	G 3/8	8	1000	5 LN	491 011	E	0,500		
	RL, RGL	G 1/2	13	1000	5	491 019	E	0,476		
	RL, RGL	G 1/2	13	1300	5	491 031	E	0,647		
	RL, RGL	M30x1,5	20	1000	7-10	491 009	E	1,052		
	RL, RGL	M30x1,5	20	1300	7-10	491 032	E	1,245		
	RL, RGL	M38x1,5	25	1300	11	491 029	E	2,360		
	Für Heizöl MS bis max. 150° - dürfen nicht in Feuerungsanlagen innerhalb der BRD eingebaut werden								For fuel oil MS up to	Pour fuel MS
6.52	M	G 1/2	13	1000	5-9	491 078	E	0,643	max. 150°C	max. 150°C
	M	G 1/2	13	1300	5-9	491 079	E	0,710		
	MS	M30x1,5	20	1000	7-9	491 081	E	0,976		
	MS	M30x1,5	20	1300	7-9	491 082	E	1,219		
	RMS	M30x1,5	20	1000	7-10	491 081	E	0,976		
	RMS	M30x1,5	20	1300	7-10	491 082	E	1,219		
	RMS	M38x1,5	25	1300	11	491 084	E	1,780		
	Schiffsausführung für Heizöl EL und MS bis max. 150°C (Edelstahl)								Ship's execution for fuel oil EL and MS up to max. 150°C	Exécution navire pour Fuel EL et MS max. 150°C
6.53	M	G 1/2	12	700		491 119	E	0,290		
	M, MS	G 1/2	12	1000	5-9	491 093	E	0,800		
	M, MS	G 1/2	12	1300	5-9	491 094	E	1,000		
	MS	M30x1,5	20	1000	7-10	491 095	E	1,200		
	MS	M30x1,5	20	1300	7-10	491 096	E	1,200		
	RMS	M30x1,5	20	1000	7-10	491 095	E	1,200		
	RMS	M30x1,5	20	1300	7-10	491 096	E	1,200		
	RMS	M38x1,5	25	1150	11	491 097	E	1,600		
	RMS	M38x1,5	25	1500	11	491 109	E	1,427		
6.54	**Einschraubstutzen**								**Adaptor**	**Raccord droit**
	G1/2" x G1/2" x 37 DN13					111 512 0003/7	E	0,070		
	M30 x 1,5 x G1 x 41 DN20					112 151 0005/7	E	0,169		
	M38 x 1,5 x G1 x 43 DN25					122 362 0007/7	E	0,174		
	G 3/8 x G 3/8 DN 8					111 011 0006/7	E	0,050		
6.55	**Rohrbogen** (o. Bild)								**Tube bend**	**Tube coude**
	DN 13					453 250	E	0,126		
	DN 20					453 251	E	0,216		
	DN 25					453 252	E	0,350		

6.63 6.64 7.1 7.2 7.3-7.5 7.6

Bild Pict. Photo	Bezeichnung Brenner-Typenreihe Burner serie Type brûleur		Bestell-Nr. Order-No. No de commande			ca. kg appr. kg env. kg	Designation	Désignation
6.60	**Ölleitungen**						**Oil lines**	**Canalisation fuel**
	Ölleitungen ohne Schneidring und Überwurfmutter zum selbstbiegen						**Oil lines** for self bending	**Conduite de fuel** à former
6.61	6 x 1 x 625 mm		111 111 4919/7	E		0,078	(without picture)	(sans photo)
	8 x 1 x 625 mm		111 111 4920/7	E		0,110		
	10 x 1 x 625 mm		111 111 4921/7	E		0,131		
	12 x 1,5 x 625 mm		111 111 4922/7	E		0,242		
	18 x 1,5 x 625 mm		111 111 4923/7	E		0,380		
6.62	6 x 1 x 1250 mm		111 111 4914/7	E		0,165		
	8 x 1 x 1250 mm		111 111 4915/7	E		0,226		
	10 x 1 x 1250 mm		111 111 4916/7	E		0,288		
	12 x 1,5 x 1250 mm		111 111 4917/7	E		0,477		
	18 x 1,5 x 1250 mm		111 111 4925/7	E		0,739		
	Schneidring						**Cutting ring**	**Olive**
6.63	DPR-L	6 L	452 770	Z		0,002		
		8 L	452 771	Z		0,002		
		10 L	452 772	Z		0,002		
		12 L	452 773	Z		0,003		
		18 L	452 775	Z		0,005		
	D-LL	6 LL	452 801	Z		0,002		
		8 LL	452 809	Z		0,003		
	Überwurfmutter						**Union nut**	**Contre écren**
6.64	M-L	6 L	452 834	Z		0,010		
		8 L	452 829	Z		0,015		
		10 L	452 828	Z		0,018		
		12 L	452 836	Z		0,025		
		18 L	452 803	Z		0,025		
	M-LL	6 LL	452 800	Z		0,006		
		8 LL	452 816	Z		0,007		
7.	**Magnetventile für Öl**						**Solenoid valves for oil**	**Vannes magnetiques pour fioul**
	Magnetventil Typ 121 C2323, 1/8" mit Spule 3764, 9 Watt stromlos geschlossen						Solenoid valve with coil 3746 currentless closed	Vanne magnétique avec bobine 3746 fermée hors tension
7.1	110 V/50-60 Hz		604 450	E		0,250		
	187-240 V/50-60 Hz		604 451	E		0,250		
	Magnetventil Typ 121 K2423, 1/8" mit Spule 483824, 19 Watt stromlos geschlossen						**Solenoid valve** with coil 19 Watt, curentless closed	**Vanne magnétique** avec bobine 19 Watt fermée hors tension
7.2	55 V/60Hz*,		604 611	E		0,480		
	58 V/50 Hz*, 60 V/60 Hz*		604 601	E		0,480		
	110 V/60Hz*,		604 612	E		0,480		
	115 V/50 Hz*, 120 V/60 Hz*		604 602	E		0,480		
	220 V/60Hz*,		604 613	E		0,480		
	230 V/50 Hz*, 240 V/60 Hz*		604 603	E		0,480		
7.3	55 V/60Hz*,		604 614	E		0,480		
	58 V/50 Hz**, 60 V/60 Hz**		604 604	E		0,480		
	110 V/60Hz*,		604 615	E		0,480		
	115 V/50 Hz**,120 V/60 Hz**		604 605	E		0,480		
	220 V/60Hz*,		604 616	E		0,480		
	230 V/50 Hz**,240 V/60 Hz**		604 606	E		0,480		
	Magnetventil Typ 122 K9321, 1/8" mit Spule 483824, 19 Watt stromlos offen						**Solenoid valve** with coil 19 Watt currentless open	**Vanne magnétique** avec bobine 19 Watt ouverte hors tension
7.4	110 V/60Hz*,		604 676	E		0,480		
	115 V/50 Hz*, 120V/60 Hz*		604 597	E		0,480		
	220 V/60Hz*,		604 677	E		0,480		
	230 V/50 Hz*, 240V/60 Hz*		604 598	E		0,480		
7.5	110 V/60Hz*,		604 678	E		0,480		
	115 V/50 Hz**,120V/60 Hz**		604 599	E		0,480		
	220 V/60Hz*,		604 679	E		0,480		
	230 V/50 Hz**,240V/60 Hz**		604 600	E		0,480		
	Magnetventil Typ 121 K6220, 1/4" mit Spule 483541, 20 Watt stromlos geschlossen						**Solenoid valve** currentless closed, with coil 20 Watt	**Vanne magnétique** fermée hors tension avec bobine 20 Watt
7.6	55 V/60Hz*,		604 630	E		0,480		
	58 V/50 Hz*, 60V/60 Hz*		604 512	E		0,480		
	110 V/60Hz*,		604 631	E		0,480		
	115 V/50 Hz*, 120V/60 Hz*		604 513	E		0,480		
	220 V/60Hz*,		604 632	E		0,480		
	230 V/50 Hz*, 240V/60 Hz*		604 514	E		0,480		



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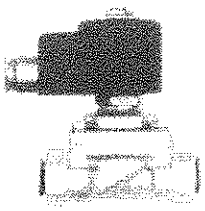

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Bild Pict. Photo	**Bezeichnung** Brenner-Typenreihe Burner serie Type brûleur	Bestell-Nr. Order-No. No de commande		ca. kg appr. kg env. kg	**Designation**	**Désignation**
	Magnetventil Typ 121 K6220, 1/4" mit Spule 483541, 20 Watt stromlos geschlossen				**Solenoid valve** currentless closed with coil 20 Watt	**Vanne magnétique** fermée hors tension avec bobine 20 Watt
7.7	55 V/60Hz*, 58 V/50 Hz**, 60V/60 Hz** 110 V/60Hz*, 115 V/50 Hz**,120V/60 Hz** 220 V/60Hz*, 230 V/50 Hz*, 240V/60 Hz**	604 633 604 515 604 634 604 516 604 635 604 517	E E E E E E	0,480 0,480 0,480 0,480 0,480 0,480		
	MagnetventilTyp 321 H2322, G3/8" mit Spule 483541, 20 Watt stromlos geschlossen				**Solenoid valve** with coil 3541 currentless closed	**Vanne magnétique** avec bobine 3541 fermée hors tension
7.6	55 V/60 Hz* 58 V/50 Hz*, 60 V/60 Hz* 110 V/60 Hz* 115 V/50 Hz*, 120 V/60 Hz* 220 V/60 Hz* 230 V/50 Hz*, 240 V/60 Hz*	604 643 604 530 604 644 604 531 604 645 604 532	E E E E E E	0,450 0,450 0,950 0,950 1,000 1,000		
	Magnetventil Typ 321 H2322, 3/8" mit Spule 483541, 20 Watt stromlos geschlossen				**Solenoid valve** with coil 3541 currentless closed	**Vanne magnétique** avec bobine 3541 fermée hors tension
7.7	55 V/60 Hz** 58 V/50 Hz**, 60 V/60 Hz** 110 V/60 Hz** 115 V/50 Hz**, 120 V/60 Hz** 220 V/60 Hz** 230 V/50 Hz**, 240 V/60 Hz**	604 646 604 533 604 647 604 534 604 648 604 535	E E E E E E	0,450 0,450 0,988 0,998 1,000 0,450		
	* Spulen-Gehäuse Standard IP44 ** Spulen-Gehäuse wasserdicht IP67				* Coil casing standard ** Coil casing waterproof	* Boitier de bobine standard ** Boitier de bobine étanche à l'eau
	Magnetventil Typ 121 G2320, G3/8" mit Spule 483541, 20 Watt stromlos geschlossen				**Solenoid valve** currentless closed	**Vanne magnétique** fermée hors tension
7.8	55 V/60 Hz* 58 V/50 Hz*, 60 V/60 Hz* 110 V/60 Hz* 115 V/50 Hz*, 120 V/60 Hz* 220 V/60 Hz* 230 V/50 Hz*, 240 V/60 Hz*	604 660 604 518 604 661 604 519 604 662 604 520	E E E E E E	0,330 0,330 0,930 0,930 0,930 0,930		
	Magnetventil Typ 121 G2320, G3/8" mit Spule 483541, 20 Watt stromlos geschlossen				**Solenoid valve** currentless closed	**Vanne magnétique** fermée hors tension
7.9	55 V/60 Hz** 58 V/50 Hz**, 60 V/60 Hz** 110 V/60 Hz** 115 V/50 Hz**, 120 V/60 Hz** 220 V/60 Hz** 230 V/50 Hz**, 240 V/60 Hz**	604 663 604 521 604 664 604 522 604 665 604 523	E E E E E E	0,330 0,330 0,930 1,039 1,093 0,930		
	** Spulen-Gehäuse Standard IP44 ** Spulen-Gehäuse wasserdicht IP67				* Coil casing standard ** Coil casing waterproof	* Boitier de bobine standard ** Boitier de bobine etanche
7.10	**Magnet-Spule** **Typ 3764** 9 Watt 110V/50-60 Hz 187-240V/50-60 Hz	 604 452 604 453	 E E	 0,135 0,130	**Solenoid valve coil**	**Bobine de vanne magnétique**
7.11	**Typ 483 824,** 19 Watt 55V/60 Hz 58V/50 Hz, 60V/60 Hz 110V/60Hz 115V/50 Hz, 120 V/60 Hz 220V/60Hz 230V/50 Hz, 240 V/60 Hz	604 620 604 551 604 621 604 552 604 622 604 553	E E E E E E	0,075 0,075 0,150 0,150 0,140 0,140		
7.12	**Typ 483 541,** 20 Watt 55V/60Hz 58V/50 Hz, 60V/60 Hz 110V/60Hz 115V/50 Hz, 120 V/60 Hz 220V/60Hz 230V/50 Hz, 240 V/60 Hz	604 638 604 554 604 639 604 555 604 640 604 556	E E E E E E	0,140 0,140 0,140 0,140 0,140 0,140		

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Bild Pict. Photo	**Bezeichnung** Brenner-Typenreihe Burner serie Type brûleur	Größe Size Grand.	Bestell-Nr. Order-No. No de commande		ca. kg appr. kg env. kg	**Designation**	**Désignation**
	Schmutzfänger					**Filter**	**Filtre**
7.13	G3/8", PN 50		499 042	Z	0,205		
	G1/2", PN 50		499 043	Z	0,330		
7.14	**Steckdose** für Ventil 121 C 2323		716 104	E	0,064	**Plug socket**	**Prise de courant**
	Anschlußkabel für Magnetventil					**Connection cable** for solenoid valve	**Câble de raccordement** pour vanne
	(ohne Bild)					(without picture)	(sans photo)
7.15	L	5-9					
	L (dreistufig)	7-10					
	RL, RGL	5-7	111 764 1302/2	E	0,060		
7.16	RL, RGL	8-10					
	MS, RMS, RGMS	5-8	112 151 1307/7	E	0,054		
7.17	MS, RGL	9-11	112 261 1305/7	E	0,094		
7.18	RMS	9-11	112 964 1301/7	E	0,139		
7.19	**Magnetventil** (ohne Bild)					**Solenoid valve**	**Vanne magnétique**
	RL8, RL8/2, RGL8-RGL10		111 774 1305/2	E	2,800	(without picture)	(sans photo)
	RL9-RL11, RGL11		111 974 1304/2	E	2,897		
	M	5	112 564 1302/2	E	2,513		
	MS	7-9	112 764 1301/2	E	2,520		
	RMS	7-10	112 574 1305/2	E	2,872		
		9-11	182 174 1301/2	E	2,969		
7.20	**Verteilerstück** (ohne Bild)					**Distributor**	**Répartiteur**
	RL5-RL8/2, RGL8-RGL10		111 574 1303/7	E	1,508	(without picture)	(sans photo)
	RL9-RL11, RGL11		111 974 1304/7	E	1,457		
	M, MS	5-9	112 564 1301/2	E	1,000		
	RMS	7-8/2	212 374 1301/7	E	1,430		
		9-11	112 974 1302/7	E	1,382		
7.21	**Anschlußteile** für Verteilerstück					**Connection parts**	**Eléments de raccordement**
	RL5-RL8/2, RGL8-RGL10		111 574 1305/2	E	0,400	for distributor	pour repartiteur
	RL9-RL11, RGL11		111 974 1303/2	E	0,500		
	M	5	112 564 1306/2	E	0,700		
	MS	7-9	112 764 1302/2	E	0,700		
	RMS	7-8/2	112 574 1306/2	E	0,600		
		9-11	112 974 1304/2	E	0,610		
7.22	**Thermometer** 0-160°C		642 011	Z	0,065	**Thermometer**	**Thermomètre**

7.23 7.26 7.27 7.28 7.29 7.30 7.31 7.32 7.34 7.33 7.35 7.36

7.39 7.40 7.41 7.42

Bild Pict. Photo	**Bezeichnung** Brenner-Typenreihe Burner serie Type brûleur	Größe Size Grand.	Bestell-Nr. Order-No. No de commande		ca. kg appr. kg env. kg	**Designation**	**Désignation**
7.23	**Einschraubstutzen**					**Adapter**	**Raccord droit**
	6LL M 10 x 1 x G 1/8" x 71		112 151 1317/7	E	0,064		
	6LL M 10 x 1 x G 1/8" x 23		111 574 1307/7	E	0,013		
	8LL M 12 x 1 x G 1/8" x 23,5	5-11	111 381 1307/7	E	0,017		
	8LL M 12 x 1 x G 1/8" x 25	7-11	111 574 1308/7	E	0,015		
	8LL M 12 x 1 x G 1/8" x 71	7-10	112 261 1310/7	E	0,059		
	10LL M 16 x 1,5 x G 1/4" x 35	5-11	111 574 1301/7	E	0,039		
	10LL M 16 x 1,5 x G 1/4" x 71,5	9-11	111 974 1302/7	E	0,083		
	12 x G 1/4" x 42		121 464 8502/7	E	0,045		
	12 x G 3/8" x 46		121 464 8505/7	E	0,020		
	12LL M 18 x 1,5 x G 1/4" x 35	5-10	111 574 1302/7	E	0,038		
	12LL M 18 x 1,5 x G 3/8" x 36,5	9-11	111 974 1303/7	E	0,053		
7.24	**Bundschraube** G 1/8"	5-11	111 574 1304/7	E	0,008	**Collar screw**	**Ecrou**
	(ohne Bild)G 1/4"	5-9	112 564 1305/7	E	0,026	(without picture)	(sans photo)
7.25	**Gewindebuchse** G 1/4"	5-9	112 564 1307/7	E	0,026	**Threaded sleeve**	**Douille filetée**
	M 20 x 1,5 (ohne Bild)					(without picture)	(sans photo)
7.26	**Aufnahmehülse** für Heizpatrone	5-9	112 564 1304/7	E	0,110	**Mounting socket**	**Support**
7.27	**Dichtring** CU					**Copper ring**	**Joint cuivre**
	10,0 x 14 x 1,5	5-11	440 034	Z	0,001		
	13,5 x 17 x 1,5	5-11	440 010	Z	0,001		
	13,5 x 25 x 2,0	5-11	440 014	Z	0,006		
	16,0 x 20 x 1,5	5-11	440 048	Z	0,001		
	17,0 x 21 x 1,5	5-11	440 003	Z	0,003		
	21,0 x 26 x 1,5	5-11	440 020	Z	0,001		
	22,0 x 27 x 1,5	5-11	440 004	Z	0,002		
7.28	**Schneidring** M 10	5-11	452 772	Z	0,001	**Cutting ring**	**Rondelle de cisaillement**
	M 12	5-11	452 773	Z	0,003		
7.29	**Überwurfmutter** M 10	5-11	452 828	Z	0,018	**Union nut**	**Raccord union**
	M 12	5-11	452 836	Z	0,025		
	Heizpatrone komplett					**Heating cartridge complete**	**Cartouche chauffante complète**
7.30	M, RMS 20 Watt	5-11	112 381 1302/2	E	0,124		
	MS 20 Watt	5-9	112 564 1303/2	E	0,188		
7.31	**Heizpatrone** 230V/20W,	5-11	794 211	E	0,048	**Heating cartridge**	**Cartouche chauffante**
	Ölleitung 6 x 1					**Oil line**	**Conduite de fuel**
7.32	Magnetventil-Düse	L5-9	111 163 0002/8	E	0,022	Solenoid valve nozzle	vanne magnétique gicleur
	Ölleitung 6 x 1 x 30					**Oil line**	**Conduite de fuel**
7.33	Verschraubung-Magnetventil	L5-9	111 163 1305/8	E	0,016	pump-oil counter	pompe-compteur d'huile
	Ölleitung Magnetventil					**Oil line solenoid valve**	**Conduite de fuel vanne magnétique**
7.34	6 x 1	L5-9	111 564 1301/8	E	0,024		
	8 x 1 x 26	L5-10	111 662 0004/8	E	0,029		
	8 x 1	L7-10T	111 794 1301/8	E	0,026		
7.35	**Ölleitung** 8 x 1 x 41	L7-10T	111 794 1302/8	E	0,023	**Oil line**	**Conduite de fuel**
	Hülse					**Sleeve**	**Douille**
7.36	GL, RGL	5-9	155 101 1303/7	E	0,040		
7.37	**Ventilträger,**	7-11	176 208 0002/7	E	0,290	**Valve seating**	**Support de vanne**
	(ohne Bild)					(without picture)	(sans photo)
7.38	**Federklammer** (ohne Bild)		176 208 0003/7	E	0,016	**Holding clamp**	**Crampon à ressort**
						(without picture)	(sans photo)
7.39	**Verschlußschraube NPG9**		730 209	Z	0,005	**Closing screw**	**Vis obturateur**
7.40	**Druckwächter**					**Pressure monitor**	**Pressostat**
	für Heizöl EL, M und S					for fuel oil	
	1 - 10 bar, Typ DSA 46		640 096	Z	0,565		
	3 - 25 bar, Typ DSA 58		640 097	Z	0,538		
7.41	**Temperaturschalter** 60°C, RMS7-11		112 774 1303/2	E	0,080	**Temperature switch**	**Thermostat**
7.42	**Heizkörper** 230V, 20 W					**Heating element**	**Elément chauffante**
	für Druckwächter		170 105 1001/2	E	0,375		


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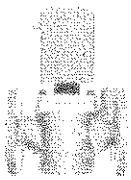
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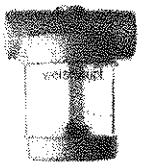
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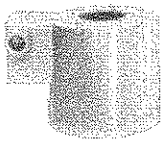
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Bild Pict. Photo	**Bezeichnung** Brenner-Typenreihe Burner serie Type brûleur	Bestell-Nr. Order-No. No de commande		ca. kg appr. kg env. kg	**Designation**	**Désignation**
8.	**Magnetventile für Gas**				**Solenoid valves**	**Vannes magnétiques DMV**
	Magnetventile **Baugruppe A mit Mengeneinstellung** **Druckbereich 0 - 500 mbar** Typ Rp Spannung/Frequenz				**Solenoid valves quality class A with quantity adjustment Pressure** Type ID	**Vannes magnétiques classe A, réglables Pression d'utilisation** Type DN
8.1	**DMV-D 507/11** 1/2-3/4 230V/50-60 Hz	605 204	E	2,200		
	DMV-D 512/11 1 230V/50-60 Hz	605 206	E	4,700		
	DMV-D 520/11 1 1/2-2 230V/50-60 Hz	605 208	E	5,800		
8.2	**DMV-D 5040/11** DN40 230V/50-60 Hz	605 210	E	9,000		
	DMV-D 5050/11 DN50 230V/50-60 Hz	605 224	E	9,400		
	DMV-D 5065/11 DN65 230V/50-60 Hz	605 216	E	14,700		
	DMV-D 5080/11 DN80 230V/50-60 Hz	605 218	E	23,700		
	DMV-D 5100/11 DN100 230V/50-60 Hz	605 220	E	30,700		
	DMV-D 5125/11 DN125 230V/50-60 Hz	605 222	E	50,700		
8.3	**MV 5150/5-S**	605 598	E	60,875		
	Magnetventil zur Entlüftung Baugruppe A				**Solenoid valve for venting quality class A**	**Vannes magnétiques gaz de mise à l'air libre classe A**
8.4	stromlos offen **LGV 507/5** Rp 3/4" mbar	605 707	Z	1,147	currentless open	ouvertes hors tension
	Magnetventil für Zündgas, Baugruppe A				**Solenoid valve for venting quality class A**	**Vannes magnétiques gaz de mise à l'air libre classe A**
8.401	**MVD 507/5** Rp 3/4" mbar	605 453	Z	4,740		
8.5	**Dichtheitsanzeigegerät** ohne Glyzerinfüllung	151 327 8501/0	Z	0,875	**Tightness indicating aggregate** without glycerine filling	**Indicateur visuel de fuite** (sans glycérine)
8.6	**Stecker** 4-polig, 250 V, 16 A, schwarz	217 304 2601/2	E	0,064	**Plug**	**Fiche**
8.7	**Flansch**				**Flange**	**Bride**
	Rp 1/2" für DMV 507	605 226	E	0,181		
	Rp 3/4" für DMV 507	605 227	E	0,173		
	Rp 1 für DMV 507	605 233	E	0,163		
	Rp 1" für DMV 512	605 228	E	0,266		
	Rp 1 1/2 für DMV 520	605 230	E	0,280		
	Rp 2 für DMV 520	605 231	E	0,285		
8.8	**Zündgasflansch** für DMV507 - DMV520	605 232	E	0,083	**Ignition gas flange**	**Bride**
8.9	**Hydraulikbremse**				**Hydraulic brake**	**Cartouche hydraulique**
	Set für DMV 507/11	605 237	E	0,274		
	DMV 5040/11	605 238	E	0,273		
	DMV 5100/11	605 239	E	0,612		
	Magnet komplett, für Typ **Nr.** Spannung/Frequenz				**Solenoid,** complete for Type No ID	**Bobine,** complet pour Type No DN
8.10	**DMV-D 507/11** **1111** 220-240V/50-60 Hz	605 941	E	0,795		
	DMV-D 512/11 **1211** 220-240V/50-60 Hz	605 942	E	1,800		
	DMV-D 520/11 **1212** 220-240V/50-60 Hz	605 943	E	4,500		
8.11	**DMV-D 5040/11** **1212** 220-240V/50-60 Hz	605 943	E	3,240		
	DMV-D 5050/11 **1212** 220-240V/50-60 Hz	605 943	E	3,240		
	DMV-D 5065/11 **1411** 220-240V/50-60 Hz	605 945	E	5,600		
	DMV-D 5080/11 **1511** 220-240V/50-60 Hz	605 946	E	10,366		
	DMV-D 5100/11 **1611** 220-240V/50-60 Hz	605 947	E	26,000		
	DMV-D 5125/11 **1711** 220-240V/50-60 Hz	605 948	E	40,000		
	Magnetspule mit eingebautem Gleichrichter Spulentyp für Magnetventiltyp DN				**Solenoid** with incorporated rectifier	**Bobine de vannes magnétiques** avec
8.12	61-S MV 5150/5-S 150	605 938	E	20,860		
8.13	100 LGV 507/5 3/4"	605 904	E	0,559		
	200 MVD507/5 3/4"	605 906	E	1,524		
8.14	**Leiterplatte**				**Conductor plate**	**Platine**
	für Spule Nr. 100	605 922	E	0,015		
8.15	**O-Ring**				**O-ring**	**Joint O**
	10,5 x 2,25 Zündgasfl. DMV 507, 512, 520	445 512	Z	0,001		
	27 x 1,5 Zündgasfl. DMV 5040 - 5125	445 517	Z	0,003		
	45 x 3 Anschlußfl.	445 518	Z	0,003		
	57 x 3 Anschlußfl. DMV 507	445 519	Z	0,003		
	75 x 3,5 Anschlußfl. DMV 512, 520	445 520	Z	0,003		
8.16	**Verschlußschraube** flach G1/8 mit O-Ring	409 040	Z	0,005	**Closing screw**	**Vis de fermeture**
8.17	**Leiterplatte** (o. Bild)				**Conductor plate** (without pict.)	**Platine** (sans photo)
	DMV 507	605 996	E			
	DMV 512 - 5080	605 997	E			
	DMV 5100 - 5125	605 998	E			


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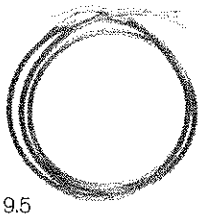
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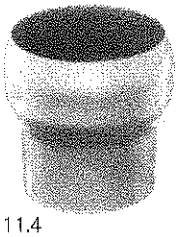
Bild Pict. Photo	**Bezeichnung** Brenner-Typenreihe Burner serie Type brûleur	Größe Size Grand.	Bestell-Nr. Order-No. No de commande		ca. kg appr. kg env. kg	**Designation**	**Désignation**
9.	**Druckwächter für Luft und Gas**					**Pressure monitor for air and gas**	**Pressostat pour air et gaz**
9.1	**Druckwächter** Typ LGW 50 A2P		691 373	E	0,190	**Pressure monitor**	**Pressostat**
	Typ GW 50 A4		691 355	Z	0,258		
	Typ GW 150 A4		691 356	Z	0,256		
	Typ GW 500 A4		691 357	Z	0,275		
	Typ GW 50 A5		691 375	Z	0,207		
	Typ GW 150 A5		691 376	Z	0,256		
	Typ GW 500 A5		691 377	Z	0,275		
9.2	**Kappe** für LGW		446 011	Z	0,001	**Cap**	**Capuchon**
9.3	**Stecker** 4-polig, 250 V, 16 A		217 304 2602/2	E	0,064	**Plug**	**Fiche**
9.4	**O-Ring** 8 x 3 für Adapter GW...A5		445 516	Z	0,001	**O-ring**	**Joint O**
	Anschlußteile für Druckwächter Luft					**Connection parts for pressure monitor-air**	**Raccords pour pressostat d'air**
9.5	**Anschlußkabel** 4 x 0,75 x 750 G, GL, RGL	5-11	151 316 2401/2	E	0,064	**Connection cable**	**Câble de raccordement**
9.6	**Rohrflansch komplett**		151 313 2402/2	E	0,055	**Pipe flange**	**Bride à tube**
9.7	**Doppelnippel** R 1/4" x 50 (Gas)		139 000 2601/7	Z	0,028	**Double nipple**	**Mamelon double**
9.8	**Einbauschraubstutzen** R1/8"		453 003	Z	0,001	**Threaded socket**	**Raccord droit**
9.9	**Silikonschlauch** 3,5 x 2 (o. Bild)		750 418	E	0,029	**Silicon-hose**	**Flexibles silikon**
9.10	**Schlauchklemme**		790 218	E	0,001	**Clamp**	**Crampon**
10.	**Gasdrossel**					**Gas throttle**	**Clapet gaz**
	Gasdrossel, komplett DN					**Gas throttle, complete**	**Clapet gaz, complet**
10.1	G, GL, RGL 50	5	151 518 2506/0	E	2,460		
	G, GL, RGL 65	7 + 8	151 707 2506/0	E	2,894		
	G, GL, RGL 80	9 + 10	151 907 2506/0	E	2,900		
	G, RGL 100	11	191 107 2506/0	E	3,871		
	G, GL, RGL 50/25	5	151 518 2508/0	E	2,627		
	G, GL, RGL 50/40	5	151 518 2507/0	E			
	G, GL, RGL, RGMS 65/40	7+8	151 707 2508/0	E			
	G, GL, RGL, RGMS 65/50	7+8	151 707 2507/0	E			
	G, GL, RGL, RGMS 80/50	9+10	151 907 2508/0	E	3,430		
	G, GL, RGL, RGMS 80/65	9+10	151 907 2507/0	E			
	G, Ausf. ZMI 80	9+10	151 907 2509/0	E	2,961		
	G, Ausf. ZMI 100	11	191 107 2509/0	E	3,872		
	G, RGL, RGMS 100/65	11	191 107 2508/0	E			
	G, RGL, RGMS 100/80	11	191 107 2507/0	E			
	G, Ausf. ZMI 50	5	151 518 2509/0	E	2,460		
	65	7	151 707 2509/0	E	3,023		
	Dichtung für Gasdrossel					**Sealing ring** for gas throttle	**Joint d'étanchéite** pour clapet gaz
10.2	G, GL, RGL 50	5	151 518 0012/7	E	0,045		
	G, GL, RGL 65	7 + 8	151 707 0002/7	E	0,053		
	G, GL, RGL 80	9 + 10	151 907 0001/7	E	0,059		
	G, RGL 100	11	177 205 0003/7	E	0,074		
10.3	**Antriebsnabe**	5-11	151 101 2504/2	E	0,076	**Driving hub**	**Moyeu de mouvement**
10.4	**Verstellhebel**	5-11	161 208 2530/7	E	0,034	**Adjusting lever**	**Levier de réglage**
10.5	**Drehfeder** 0,8 x 10	5-11	151 101 2508/7	E	0,022	**Spring**	**Ressort**

11.1-11.3
11.17-11.9



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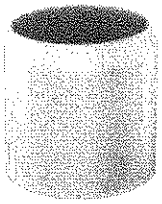

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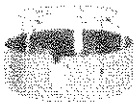

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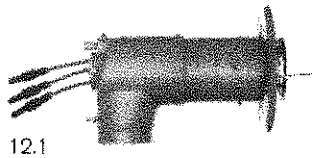
Bild Pict. Photo	**Bezeichnung** Brenner-Typenreihe Burner serie Type brûleur		Größe Size Grand.	Bestell-Nr. Order-No. No de commande			ca. kg appr. kg env. kg	**Designation**	**Désignation**
11.	**Flammkopf für Ölbrenner**							**Combustion head for oil burners**	**Tête de combustion pour brûleurs**
	Flammrohr, ohne Stauscheibe							**Flame tube,** without air diffuser disk Flame tube type	**Tube de combustion,** sans déflecteur Tube de combustion type
		Flamm-rohrtyp							
11.1	L, M, RL	M5/1a	5	111 512 1412/7	E		1,340		
	L, M, RL	M5/2a	5	151 327 1402/7	E		1,128		
	(o. Bild)		5 LN	111 564 1401/2	E		1,200	(without photo)	(sans photo)
11.2	L, MS, RL, RMS	M6/1a	7	111 612 1401/7	E		2,190		
	L, MS, RL, RMS	M7/1a	7 + 8	111 762 1404/7	E		2,408		
	L, MS, RL, RMS	M8/1a	8	111 862 1403/7	E		2,720		
11.3	L, MS, RL, RMS	G7/2a	8/2	121 262 1413/7	E		2,900		
	L, MS, RL, RMS	U2/1	8/2	121 262 1410/2	E		2,390		
11.4	L, MS, RL, RMS	M9/1a	9	111 964 1401/7	E		2,275		
11.5	L, RL, RMS	M10/2	10	181 074 1403/2	E		3,403		
11.6	RL, RMS	M11/1	11	121 362 1405/2	E		6,500		
	Flammrohr, ohne Stauscheibe für höhere Wärmebelastung (z. B.: schamottierte Brennkammern)							**Flame tube,** without air diffuser disk, for higher thermal stress (f.i. fire-clay lined combustion	**Tube de combustion,** sans déflecteur pour la puissance calorifique supérieure (par exemple:
11.7	L, M, RL	H1M5/1a	5	111 512 1415/7	E		1,330		
	L, M, RL	H1M5/2a	5	111 512 1416/7	E		1,130		
11.8	L, MS, RL, RMS	H1M6/1a	7	111 612 1408/7	E		2,200		
	L, MS, RL, RMS	H1M7/1a	7 + 8	111 762 1406/7	E		2,380		
	L, MS, RL, RMS	H1M8/1a	8	111 862 1404/7	E		2,720		
11.9	L, MS, RL, RMS	H1G7/2a	8/2	111 862 1405/7	E		2,640		
	L, MS, RL, RMS	H1U2/1	8/2	111 862 1405/2	E		2,160		
11.10	L, MS, RL, RMS	H1M9/1a	9	111 964 1404/7	E		2,280		
11.11	RL, RMS	H1M10/2	10	181 074 1404/2	E		3,600		
11.12	RL, RMS	H1M11/1	11	121 366 1412/2	E		6,000		
	Stauscheibe komplett für Flammrohr	Ø mm						**Air diffuser disk complete** for flame tube	**Déflecteur complet** pour tube de combustion
11.13	M5/1a, M5/2a	125 x 40	5	111 512 1407/2	E		0,404		
	M5/1a	145 x 40	5	111 512 1411/2	E		0,453		
	(o. Bild)	130 x 22	5 LN	111 564 1402/2	E		0,450	(without photo)	(sans photo)
11.14	M6/1a	145 x 40	7	111 614 1405/2	E		0,602		
	M6/1a, M7/1a, M8/1a	155 x 50	7 + 8	111 614 1403/2	E		0,694		
	M6/1a, M7/1a, M8/1a	165 x 50	7 + 8	111 614 1404/2	E		0,742		
	M6/1a, M7/1a, M8/1a	175 x 50	7 + 8	111 862 1401/2	E		0,799		
11.15	G7/2a, U2/1	155 x 50	8/2	121 262 1408/2	E		0,480		
	G7/2a, U2/1	165 x 50	8/2	121 262 1411/2	E		0,540		
	G7/2a, U2/1	175 x 50	8/2	121 262 1412/2	E		0,580		
11.16	M9/1a	165 x 50	8T/2, 9	111 964 1404/2	E		1,102		
	M9/1a	185 x 50	8T/2, 9	111 964 1405/2	E		1,200		
11.17	M10/2	185 x 50	10	181 074 1401/2	E		1,386		
11.18	M10/2	200 x 50	10	181 074 1402/2	E		1,456		
11.19	M11/1	245 x 70	11	181 174 1402/2	E		1,862		
		260 x 70	11	181 174 1403/2	E		1,965		
	Reduzierung							**Reducing**	**Réduction**
11.20	von Baugröße 7 + 8 auf 5			111 762 0004/7	E		2,057	from construction size ..... to	De grandeur ..... à .....

Bild Pict. Photo	Bezeichnung Brenner-Typenreihe Burner serie Type brûleur		Bestell-Nr. Order-No. No de commande			ca. kg appr. kg env. kg	Designation	Désignation
11.30	**Flammkopfverlängerung**						**Combustion head extension**	**Rallonge tête de combustion**
	Flammkopfverlängerung, kompl.*						**Combustion head extension complete***	**Rallonge tête de combustion, complète***
	Verlängerung 100 mm							
11.31		L5Z	110 000 2901/2	E		2,100	for burner	pour brûleur
		RL5	110 009 8101/2	E		2,100		
11.32	Verlängerung 120 mm	L7Z/L8Z	110 000 3001/2	E		2,690		
		RL7	110 010 5801/2	E		2,750		
		L5Z	110 000 3301/2	E		2,428		
		L7Z/L8Z	110 000 3401/2	E		2,920		
		L8Z/2	110 000 4601/2	E		3,000		
		L9Z	110 006 7501/2	E		3,000		
	Verlängerung 150 mm	RL5	110 009 8201/2	E		3,500		
		RL7	110 010 5901/2	E		3,500		
		RL8	110 002 4201/2	E		3,640		
		RL8/2	110 002 4601/2	E		3,650		
		RL9	110 006 7601/2	E		4,320		
		RL10	180 000 4601/2	E		4,100		
		RL11	180 000 2401/2	E		4,300		
		M5Z	110 010 8101/2	E		3,420		
		MS7Z/MS8Z	110 010 8301/2	E		4,109		
		MS8Z/2	110 010 8501/2	E		4,883		
		MS9Z	110 010 8701/2	E		4,922		
		RMS7/RMS8	110 010 9001/2	E		4,000		
		RMS8/2	110 010 9201/2	E		4,100		
		RMS9	110 010 9401/2	E		4,200		
		RMS10	180 000 8401/2	E		4,300		
		RMS11	180 000 8601/2	E		4,400		
		L7T, L8T	110 005 9301/2	E		4,500		
		L8/2T	110 005 9501/2	E		4,700		
		L9T	110 005 9701/2	E		4,900		
		L10T	180 000 4401/2	E		5,000		
11.33	Verlängerung 200mm	L5Z	110 000 3701/2	E		3,000		
		L7Z/L8Z	110 000 3801/2	E		3,500		
		RL5	110 009 8301/2	E		3,000		
		RL7	110 010 6001/2	E		3,320		
11.34	Verlängerung 250 mm	L5Z	110 000 4101/2	E		3,100		
		L7Z/L8Z	110 000 4201/2	E		3,740		
		L8Z/2	110 000 4301/2	E		4,660		
		L9Z	110 000 4302/2	E		4,500		
		RL5	110 009 8401/2	E		3,100		
		RL7	110 010 6101/2	E		3,750		
		RL8	110 002 4401/2	E		4,630		
		RL8/2	110 007 2401/2	E		4,000		
		RL9	110 002 8701/2	E		5,450		
		RL10	180 000 4701/2	E		5,500		
		M5Z	110 010 8201/2	E		4,056		
		MS7Z/MS8Z	110 010 8401/2	E		4,905		
		MS8Z/2	110 010 8601/2	E		6,068		
		MS9Z	110 010 8801/2	E		6,107		
		RMS7/RMS8	110 010 9101/2	E		4,000		
		RMS8/2	110 010 9301/2	E		4,100		
		RMS9	110 010 9501/2	E		4,200		
		RMS10	180 000 8501/2	E		6,600		
		L7T, L8T	110 005 9401/2	E		4,000		
		L8T/2	110 005 9601/2	E		4,100		
		L9T	110 005 9801/2	E		4,200		
		L10T	180 000 4501/2	E		4,400		
11.35	Verlängerung 300 mm	RL11	180 000 0107/2	E		4,700		
		RMS11 (ohne Bild)	180 000 8701/2	E		4,900	(without picture)	(sans photo)
	* andere Längen bzw. Verlängerungen für andere Brennertypen auf Anfrage.						* Other lengths or resp. extensions for other burner types on inquiry.	* des longueurs resp. rallonge-ments ultérieures pour autres types de brûleur à demande.
	Stauscheibe (ohne Bild)						**Air diffuser disk**	**Déflecteur**
	für Flammrohrverl.	Ø mm					for combustion head	pour rallongement de tube
11.36	M5/1a, M5/2a	125 x 40	111 512 8304/2	E		0,417	extension (without picture)	de combustion (sans photo)
		135 x 40	111 512 8306/2	E		0,422		
	M5/1a	145 x 40	111 512 8305/2	E		0,463		
	M6/1a	145 x 40	111 762 8303/2	E		0,615		



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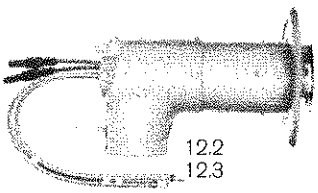

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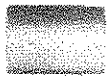

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Bild Pict. Photo	Bezeichnung Brenner-Typenreihe Burner serie Type brûleur		Größe Size Grand.	Bestell-Nr. Order-No. No de commande			ca. kg appr. kg env. kg	Designation	Désignation
	M6/1a, M7/1a, M8/1a	155 x 50		111 762 8302/2	E		0,719		
	M6/1a, M7/1a, M8/1a	165 x 50		111 762 8304/2	E		0,759		
	M6/1a, M7/1a, M8/1a	175 x 50		111 862 8302/2	E		0,783		
	Zündkabel für Verlängerungen siehe Pos. 12.60							Ignition lines for extensions see pos. 12.60	Lignes d'allumage pour rallongements voir pos. 12.60
12.	**Flammkopf für G/GL/RGL-Brenner**							**Combustion head for G/GL/RGL-burner**	**Tête de combustion pour brûleurs G/GL/RGL**
	Mischgehäuse, komplett							**Mixing chamber, complete**	**Chambre de mélange, complète**
12.1		G	5	151 518 1421/2	E		3,840		
		G	5-NA	151 518 1428/2	E		2,163		
		G	7	151 707 1413/2	E		4,700		
		G	7-NA	151 707 1428/2	E		4,079		
		G	8	151 807 1407/2	E		5,286		
		G	9 + 10	151 907 1401/2	E		7,383		
		G	11	191 107 1401/2	E		11,150		
12.2		GL	5	155 518 1407/2	E		4,100		
		GL	7	155 707 1405/2	E		4,940		
		GL	8	155 807 1403/2	E		5,526		
		GL	8-T	155 808 1403/2	E		5,736		
		GL	9	155 907 1401/2	E		7,327		
		GL	9-T	155 908 1401/2	E		5,206		
12.3		RGL	5	156 518 1406/2	E		4,292		
		RGL	7	156 707 1406/2	E		5,100		
		RGL	8	156 807 1401/2	E		6,693		
		RGL	9 + 10	156 907 1401/2	E		8,065		
		RGL	11	196 107 1401/2	E		11,689		
12.4	**Mischgehäuse**	G, GL, RGL	5	151 518 1437/7	E		0,805	**Mixing chamber**	**Chambre de mélange**
		G	5-NA	151 518 1428/1	E		1,511		
		G, GL, RGL	7	151 707 1420/7	E		1,065		
		G	7-NA	151 707 1428/1			3,169		
		G, GL, RGL	8	151 707 1436/7	E		1,005		
		G, GL, RGL	9 + 10	151 907 1401/7	E		1,920		
		G, RGL	11	161 308 1483/7	E		2,920		
12.5	**Mischrohr außen**	G, GL, RGL	5	151 518 1439/7	E		0,781	**Mixing tube outside**	**Tube de mélange**
		G, GL, RGL	7	151 707 1421/7	E		0,915		
		G, GL, RGL	8	151 707 1435/7	E		0,971		
		G, GL, RGL	9 + 10	151 907 1407/7	E		0,959		
		G, RGL	11	161 308 1493/7	E		1,240		
12.6	**Mischrohr innen**	G, GL, RGL	5	151 518 1443/7	E		0,613	**Mixing tube inside**	**Tube de mélange intérieur**
		G, GL, RGL	7	151 707 1422/7	E		0,689		
		G, GL, RGL	8-10	151 907 1408/7	E		1,162		
		G, RGL	11	161 308 1494/7	E		1,740		
12.7	**Stauscheibe**	Ø mm						**Air diffuser assembly complete**	**Déflecteur complet**
	G, GL, RGL	100 x 50	5	151 518 1420/2	E		0,097		
	G	162 x 50	5-NA	151 518 1453/7	E		0,334		
	G, GL, RGL	110 x 50	7	151 327 1417/2	E		0,129		
	G	190 x 60	7-NA	217 304 1419/7	E		0,640		
	G, GL, RGL	120 x 50	8	151 707 1421/2	E		0,151		
	G, GL, RGL	125 x 50		151 518 1417/2	E		0,170		
	G, GL, RGL	135 x 50		151 707 1409/2	E		0,169		
	G, GL, RGL	155 x 50	8 Loos	150 807 1410/2	E		0,317		
	G, GL, RGL	130 x 70	9-10	151 907 1405/2	E		0,150		
	G, RGL	155 x 70	11	191 107 1402/2	E		0,283		
12.8	G, GL, RGL	173 x 100	5	151 518 1425/2	E		0,407		
	G, GL, RGL	213 x 110	7	151 707 1410/2	E		0,600		
	G, GL, RGL	213 x 120	8	151 707 1420/2	E		0,541		
	G, GL, RGL Einsch.	270 x 70	9 + 10	158 907 1403/2	E		1,263		
	G, GL, RGL	270 x 130	9 + 10	151 907 1406/2	E		1,036		
	G, RGL	315 x 155	11	161 308 1444/2	E		1,254		
12.9	**Hülse**								
	G, GL, RGL		5	151 518 1427/7	E		0,197	**Socket**	**Douille**
	G, GL, RGL		7	151 707 1413/7	E		0,170		
	G, GL, RGL		8	151 707 1433/7	E		0,428		
	G, GL, RGL		9 + 10	161 208 1454/7	E		0,313		
	G, RGL		11	161 308 1484/7	E		0,328		

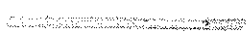
12.10 12.11 12.12 12.13 12.14 12.15 12.16 12.17 12.18

12.19 12.20 12.22 12.23

Bild Pict. Photo	Bezeichnung Brenner-Typenreihe Burner serie Type brûleur		Größe Size Grand.	Bestell-Nr. Order-No. No de commande		ca. kg appr. kg env. kg	Designation	Désignation
12.10	**Hülse**	G, GL, RGL	5	151 327 1453/7	E	0,302	**Regulating socket**	**Pipe de réglage**
		G, GL, RGL	7	151 707 1425/7	E	0,292		
		G, GL, RGL	8	151 707 1443/7	E	0,300		
		G, GL, RGL	9-10	151 907 1420/7	E	0,580		
		G, RGL	11	161 408 1429/7	E	1,080		
12.101	**Düseneinsatz** (o. Bild)	G	5-NA	151 518 1454/7	E	0,054	**Nozzle insertion**	**Element de gicleur**
		G	7-NA	151 707 1451/7	E	0,120		
12.11	**Düsenring**		5	151 518 1447/7	E	0,174	**Nozzle ring**	**Rondelle de gicleur**
			7	151 707 1445/7	E	0,213		
			8	151 807 1405/7	E	0,205		
			9	151 907 1421/7	E	0,246		
			11	161 308 1474/7	E	0,241		
12.12	**Elektrodenhalter** komplett						**Electrode holder complete**	**Support électrodes complet**
		G	5	151 518 1422/2	E	0,540		
		G	7	151 707 1406/2	E	0,359		
		G	8	151 707 1419/2	E	0,580		
		G	9 + 10	151 907 1402/2	E	0,770		
		G	11	161 308 1442/2	E	2,000		
	Düsenkopf, komplett						**Nozzle head complete**	**Ligne de gicleur complet**
12.13		GL	5	155 518 1408/2	E	0,731		
		GL	7	155 707 1406/2	E	0,750		
		GL	8	155 707 1408/2	E	0,820		
		GL	9	155 907 1402/2	E	0,769		
		GL, Ausf. T	8	155 808 1402/2	E	1,030		
		GL, Ausf. T	9	155 908 1402/2	E	1,131		
12.14		RGL	5	156 518 1407/2	E	0,932		
		RGL	7	156 707 1407/2	E	0,920		
		RGL	8	156 707 1409/2	E	1,987		
		RGL	9 + 10	156 907 1402/2	E	1,760		
		RGL	11	196 107 1402/2	E	2,539		
		RGMS	7 + 8	158 707 1410/2	E	2,313		
		RGMS	9 + 10	158 907 1406/2	E	2,308		
		RGMS	11	198 107 1403/2	E	2,809		
12.15	**Verschlußkörper,** G		9-10	151 907 1406/7	E	0,236	**Closing plug**	**Bouchon opturateur**
			11	161 308 1457/7	E	1,310		
	Düsenkopf						**Nozzle head**	**Ligne de gicleur**
12.16	ohne Absperrvorrichtung	RGL	5-7	156 327 1403/2	E	0,229		
	mit Absperrvorrichtung	RGL	8-11	111 381 1009/2	E	0,899		
		RGMS	7-11					
	Zündelektroden						**Ignition electrodes**	**Electrodes d'allumage**
12.17		G	5-8	151 327 1433/7	E	0,042		
		G	5/7-NA	132 101 1403/7	E	0,012		
		G, links	9-11	111 974 1007/7	E	0,090		
		rechts	9-11	111 974 1008/7	E	0,090		
12.18		GL, links	5-9	151 327 1433/7	E	0,042		
		rechts	5-9	155 327 1420/7	E	0,042		
		RGL	5-7	151 327 1433/7	E	0,042		
		links	8-11	111 974 1007/7	E	0,090		
		rechts	8-11	111 974 1008/7	E	0,090		
	Fühlerelektrode						**Sensor electrode**	**Sonde d'ionisation**
12.19		G	5-NA	232 100 1420/7	E	0,011		
		G	7-NA	132 101 1404/7	E	0,013		
		85 x 150, G	5-7	151 327 1434/7	E	0,047		
		85 x 200, G	8	151 327 1435/7	E	0,052		
		200 x 220, G	9-11	151 327 1419/7	E	0,097		
	Scheibe (Zündelektrode)						**Disk** (electrode holder)	**Rondelle** (support électrodes)
12.20		G, GL	5-9	151 327 1436/7	E	0,010		
	Bügel (ohne Bild)						**Bracket** (without picture)	**Etrier** (sans photo)
12.21		G, RGL	9-11	111 011 1012/7	E	0,013		
		GL, RGL	5-7	155 103 1404/7	E	0,009		
	Klemmstück (Fühlerelektrode)					0,009	**Shim** (electrode holder)	**Rondelle** (support électrodes)
12.22		G	5-11	151 327 1437/7	E	0,005		
		G	5-7-NA	251 303 1408/7	E	0,005		
	Elektrodenhalter						**Electrode holder**	**Support électrodes**
12.23		G, GL	5-7	251 103 1401/7	E	0,060		
		GL Ausführung T	8 + 9	155 808 1401/7	E	0,148		
		RGL	5 - 7	156 327 1401/7	E	0,067		





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12.35 12.36 12.37 12.38 12.39 12.40 12.41 12.43

Bild Pict. Photo	**Bezeichnung** Brenner-Typenreihe Burner serie Type brûleur		Größe Size Grand.	Bestell-Nr. Order-No. No de commande		ca. kg appr. kg env. kg	**Designation**	**Désignation**
	Elektrodenhalter						**Electrode holder**	**Support électrodes**
12.24		G9, RGL8-10		151 907 1409/7	E	0,135		
		G, GL	8 + 9	155 907 1406/7	E	0,131		
		G, RGL	11	161 308 1488/7	E	0,202		
	Haltering						**Support ring**	**Rondelle support**
12.25		G, GL,RGL	5-7	151 101 1425/7	E	0,026		
		G, GL, RGL (o. Bild)	8-10	151 907 1402/7	E	0,060		
		G, RGL (o. Bild)	11	161 308 1482/7	E	0,101		
	Stehbolzen	Länge mm					**Threaded rod**	**Tige filetée**
12.27	G, GL	177	5	151 518 1446/7	E	0,063		
	G, GL	219	7	151 707 1442/7	E	0,082		
	G, GL	218	8	151 707 1426/7	E	0,067		
	G, GL	236	9 + 10	155 907 1401/7	E	0,072		
	RGL	118	8	156 707 1407/7	E	0,034		
	G, RGL	192	11	196 107 1402/7	E	0,115		
12.28	**Düsenkopf**	GL	5	155 518 1409/2	E	0,074	**Nozzle tube**	**Tube gicleur**
		GL	7	155 707 1409/2	E	0,084		
		GL	8-9	155 327 1414/2	E	0,060		
	Druckschlauch	DN					**Pressure hose**	**Flexible pression**
12.30	GL, RGL	6 x 600/ 8mm	5-8	491 214	E	0,099		
	GL, RGL	6 x 800/ 8mm	9-11	491 227	E	0,131		
	RGL	8 x 640/10mm	11	491 220	E	0,174		
12.31	**Schneidring**	D 08-LL		452 809	Z	0,001	**Cutting ring**	**Olive**
		D 10-L/S		452 772	Z	0,001		
12.32	**Überwurfmutter**	M 08-LL		452 816	Z	0,007	**Union nut**	**Contre écrou**
		M 10-L		452 828	Z	0,018		
	Verschraubung						**Screwing**	**Presse-etoupe**
12.33	GL	GR 8/6LL	5-9	450 107	Z	0,024		
	RGL	GR10/8PL	11	452 048	Z	0,023		
12.34	**Zündrohr**	G, GL, RGL	5	151 518 1440/7	E	0,048	**Pilot tube**	**Tube pilote**
		G, GL, RGL	7	151 707 1424/7	E	0,085		
		G, GL, RGL	8	151 707 1434/7	E	0,086		
12.35	**Zündrohr,**	G, GL, RGL	9 + 10	161 208 1466/7	E	0,113	**Ignition pipe**	**Tube de allumage**
		G, RGL	11	161 308 1495/7	E	0,140		
12.36	**Anschlußflansch,**	G, GL, RGL	8-11	161 208 1463/7	E	0,155	**Connection flange**	**Bride raccords**
12.37	**Anschlußwinkel,**	G, GL, RGL	8-11	161 208 1431/2	E	0,189	**Connection angle**	**Tube raccords**
12.38	**Spannhülse,**	G, GL, RGL	8-11	161 208 1465/7	E	0,061	**Clamping sleeve**	**Entrètoise**
12.39	**Gasschlauch**	DN 12 x 350	8-10	491 202	E	0,064	**Ignition gas hose**	**Flexible vanne d'allumage**
		DN 12 x 400	11	491 201	E	0,070		
12.40	**Verschlußstopfen**	G, GL, RGL	5	151 327 1454/7	E	0,012	**Closing plug**	**Bouchon obturateur**
		G, GL, RGL	7 + 8	151 907 1419/7	E	0,042		
12.41	**Zündkopf**	G, GL, RGL	5	151 327 1420/2	E	0,015	**Ignition head**	**Tête allumage**
		G, GL, RGL	7	151 707 1414/2	E	0,061		
		G, GL, RGL	8	150 007 4402/2	E	0,030		
		G, GL, RGL	9-10	161 208 1430/2	E	0,065		
		G, RGL	11	191 107 1404/2	E	0,055		
	Zündkabel (o.B.)	mm lang					**Ignition line extension** (without picture)	**Prolongateur pour lignes d'allumage** (sans photo)
12.42	G, GL, RGL	290	5	111 151 5733/2	E	0,047		
	G, GL, RGL	390	5 NA	111 151 5714/2	E	0,030		
	G, GL, RGL	340	7-10	111 151 5734/2	E	0,049		
	G, RGL	390	11	111 151 5735/2	E	0,052		
	G	440	7-NA	111 151 5716/2	E	0,059		
	Fixierbolzen						**Arresting bolt**	**Manchons de fixation**
12.43		G, GL, RGL	5	151 518 1457/7	E	0,012		
		G, GL, RGL	7	151 707 1452/7	E	0,017		
		G, GL, RGL	8	151 707 1453/7	E	0,018		
		G, GL, RGL	9 + 10	151 907 1422/7	E	0,024		
		G, RGL	11	191 107 1403/7	E	0,027		
12.44	**Ionisationskabel** (ohne Bild)						**Ionization line** (without picture)	**Ligne d'ionisation** (sans photo)
	290 mm lang		5	251 103 1403/2	E	0,043		
	340 mm lang		7-10	251 103 1404/2	E	0,046		
	390 mm lang		5 NA	250 103 1425/2	E	0,035		
	490 mm lang		7 NA	250 103 1426/2	E	0,037		

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Bild Pict. Photo	**Bezeichnung** Brenner-Typenreihe Burner serie Type brûleur			Größe Size Grand.	Bestell-Nr. Order-No. No de commande			ca. kg appr. kg env. kg	**Designation**	**Désignation**
	Flammrohr, ohne Stauscheibe Ø mm								**Flame tube,** without air diffuser disk	**Tube de combustion,** sans deflecteur
12.45	G	G5/3-a		5-NA	151 518 1432/2	E		2,012		
	G, GL, RGL	200	G5/1a	5	111 612 1401/7	E		2,190		
	G, GL, RGL	250	G7/1a	7	151 707 1412/7	E		2,720		
	G	G7/3-A		7-NA	151 707 1427/2	E		5,840		
	G, GL, RGL	265	G7/2a	8	121 262 1413/7	E		2,900		
	G, GL, RGL	325	UG2/1a	9 + 10	161 208 1462/7	E		3,500		
	G, RGL	380	UG3/1a	11	161 308 1471/7	E		7,410		
	Flammrohr, ohne Stauscheibe für höhere Wärmebelastung (z. B.: schamottierte Brennkammern) Ø mm								**Flame tube,** without air diffuser disk for higher thermal stress (f.i. fire-clay lined combustion chambers)	**Tube de combustion** sans déflecteur pour la puissance calorifique supérieure (par exemple: chambre de combustion chamotte)
12.46	G, GL, RGL	200	H1M6/1a	5	111 612 1408/7	E		2,200		
	G, GL, RGL	250	H1G7/1a	7	151 707 1430/7	E		2,980		
	G, GL, RGL	265	H1G7/2a	8	111 862 1405/7	E		2,640		
	G, GL, RGL	325	H1UG2/1a	9 + 10	161 208 1471/7	E		3,480		
	G, RGL		H1UG3/1a	11	161 309 1401/7	E		7,450		
12.50	**Flammkopfverlängerung**								**Combustion head extension**	**Rallonge tête de combustion**
	Mischgehäuse, komplett								**Mixing chamber complete**	**Chambre de mélange compl.**
12.51	Verlängerung 100 mm		G	5	150 003 0901/2	E		4,876	Extended by mm	Rallonge mm
			G	5-NA	150 518 1406/2	E		2,345		
			G	7	150 003 1101/2	E		5,600		
			G	7-NA	150 707 1422/2	E		4,693		
			G	8	150 007 6001/2	E		6,560		
			G	9 + 10	150 002 4401/2	E		8,720		
12.52			GL	5	150 003 1001/2	E		5,080		
			GL	7	150 003 1201/2	E		5,980		
			GL	8	150 007 6801/2	E		6,900		
			GL	9	150 002 5001/2	E		8,750		
			GL, Ausf. T	8	150 007 7601/2	E		7,040		
			GL, Ausf. T	9	150 006 9701/2	E		9,020		
			RGL	5	150 006 3201/2	E		5,389		
			RGL	7	150 006 3501/2	E		6,085		
			RGL	8	150 007 8401/2	E		8,050		
			RGL	9 + 10	150 002 5601/2	E		9,950		
12.53	Verlängerung 200 mm		G	5	150 001 0901/2	E		5,840		
			G	5-NA	150 518 1407/2	E		2,538		
			G	7	150 001 1001/2	E		6,870		
			G	7-NA	150 707 1423/2	E		5,230		
			G	8	150 007 6101/2	E		8,000		
			G	9 + 10	150 002 4501/2	E		11,200		
			G	11	190 000 1401/2	E		13,800		
12.54			GL	5	150 001 1401/2	E		6,026		
			GL	7	150 001 1501/2	E		7,100		
			GL	8	150 007 6901/2	E		9,300		
			GL	9	150 002 5101/2	E		11,200		
			GL, Ausf. T	8	150 007 7701/2	E		9,000		
			GL, Ausf. T	9	150 006 8901/2	E		11,500		
			RGL	5	150 006 3301/2	E		6,294		
			RGL	7	150 006 3601/2	E		7,200		
			RGL	8	150 007 8501/2	E		10,500		
			RGL	9 + 10	150 002 5701/2	E		12,500		
			RGL	11	190 000 1601/2	E		12,300		
12.55	Verlängerung 300 mm		G	5	150 002 3801/2	E		5,724		
			G	5-NA	150 518 1408/2	E		6,000		
			G	7	150 001 1101/2	E		8,000		
			G	7-NA	150 707 1424/2	E		5,611		
			G	8	150 007 6201/2	E		9,210		
			G	9 + 10	150 001 2701/2	E		17,500		
			G	11	190 000 1501/2	E		16,548		
12.56			GL	5	150 002 3901/2	E		7,100		
			GL	7	150 001 1601/2	E		8,300		
			GL	8	150 007 7001/2	E		9,600		
			GL	9	150 001 2801/2	E		17,500		
			GL, Ausf. T	8	150 007 7801/2	E		9,800		
			GL, Ausf. T	9	150 006 9001/2	E		17,900		
			RGL	5	150 006 3401/2	E		6,199		
			RGL	7	150 006 3701/2	E		8,500		
			RGL	8	150 007 8601/2	E		10,800		
			RGL	9 + 10	150 001 2901/2	E		12,986		
			RGL	11	190 000 1701/2	E		17,000		

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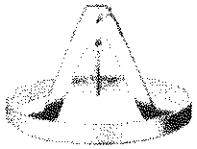

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Bild Pict. Photo	**Bezeichnung** Brenner-Typenreihe Burner serie Type brûleur		Größe Size Grand.	Bestell-Nr. Order-No. No de commande		ca. kg appr. kg env. kg	**Designation**	**Désignation**
	Verlängerungsrohr						**Extension pipe**	**Tube de rallonge**
12.57	Verlängerung 100 mm	G, GL	5	150 518 1405/7	E	1,400		
		G, GL	7 + 8	150 707 1406/7	E	1,752		
		G, GL, RGL	9 + 10	150 907 1421/7	E	2,285		
12.58	Verlängerung 200 mm	G, GL	5	150 518 1406/7	E	2,190		
		G, GL	7 + 8	150 707 1407/7	E	2,716		
		G, GL, RGL	9 + 10	150 907 1422/7	E	3,520		
		G, RGL	11	160 001 3101/7	E	6,280		
12.59	Verlängerung 300 mm	G, GL	5	150 518 1401/2	E	3,120		
		G, GL	7 + 8	150 707 1408/7	E	3,780		
		G, GL, RGL	9 + 10	150 907 1423/7	E	4,920		
		G, RGL	11	160 001 0101/7	E	8,740		
	Zündkabel, komplett (ohne Bild)						**Ignition line, complete** (without picture)	**Ligne d'allumage compléte** (sans photo)
	Verlängerung mm							Rallonge mm
12.60	340			111 151 5734/2	E	0,049		
	390			111 151 5735/2	E	0,052		
	440			111 151 5736/2	E	0,055		
	490			111 151 5737/2	E	0,058		
	540			111 151 5738/2	E	0,062		
	590			111 151 5739/2	E	0,065		
	640			111 151 5740/2	E	0,066		
	690			111 151 5741/2	E	0,069		
	740			111 151 5742/2	E	0,071		
	790			111 151 5743/2	E	0,072		
	840			111 151 5744/2	E	0,077		
	890			111 151 5745/2	E	0,083		
	940			111 151 5746/2	E	0,083		
	990			111 151 5747/2	E	0,088		
	1040			111 151 5748/2	E	0,086		
	1090			111 151 5749/2	E	0,093		
	1140			111 151 5750/2	E	0,093		
	1190			111 151 5751/2	E	0,097		
	1340			111 151 5752/2	E	0,127		
13.	**Düsenstock**						**Nozzle assembly**	**Ligne de gicleur**
	Düsenkreuz	Ø					**Nozzle support**	**Croisillon porte ligne gicleur**
13.1		140 L	5	111 552 1001/7	E	0,273		
		145 L	5 LN	211 364 1002/7	E	0,285		
13.2		180 L	7+8	111 652 1002/7	E	0,390		
13.3		180 L	8/2	111 862 1001/7	E	0,385		
13.4		234 L	9	111 964 1001/7	E	0,557		
13.5		140 RL	5	111 552 1001/7	E	0,273		
13.6		180 RL, RMS	7-8/2	111 782 1001/7	E	0,360		
13.7		234 RL, RMS	9+10	111 974 1001/7	E	0,557		
13.8		234 RL, RMS	11	181 174 1001/7	E	0,600		
	Düsenkreuz, Bohrung 55 Ø						**Nozzle support** hole 55 Ø	**Croisillon** Ø 55
13.9		M	5	112 564 1003/7	E	0,377		
		MS	7 + 8	112 764 1003/7	E	0,496		
		MS	8/2	112 866 1003/7	E	0,482		
		MS	9	112 964 1021/7	E	0,671		
	Düsenkopf						**Nozzle head**	**Ligne de gicleur**
13.10	L (zweistufig) mit Düsenkreuz und Zündelektroden		5	111 562 1003/2	E	0,820	(two stage) with nozzle support and ignition electrodes	(deux allures) avec croissillon et electrodes d'allumage
			5 LN	211 364 1003/2	E	0,850		
			7 + 8	111 762 1001/2	E	0,970		
			8/2	111 862 1002/2	E	0,959		
			9	111 964 1002/2	E	1,175		
13.11	RL	ohne Absperrventil	5-7	111 273 1001/2	E	0,420	without shut-off	sans blocage
13.12	RL	mit Absperrvorrichtung	8-11	111 381 1009/2	E	0,899	with equipment	avec blocage
	RMS	mit Absperrvorrichtung	7-11	111 381 1009/2	E	0,899		
	MS	(beheizte Ausführung) o. Bild	5-9	212 163 1001/2	E	1,126	(heated version) without pict.	sans photo
	L	(dreistufig) o. Bild	5	110 594 1001/2	E	0,946	(three stage) without pict.	(trois allures) sans photo
			7 + 8	111 794 1001/2	E	0,900		
			8/2	111 896 1001/2	E	1,000		
			9+10	111 994 1001/2	E	2,309		
13.13	L	zum selbstbiegen (o. Bild)	5-9 Z	111 261 5701/2	E	0,673	(for self bending)	
			7-10 T	110 005 9802/1	E	0,817		
13.14	**Schneidring**	D 06-LL		452 800	E	0,006	**Cutting ring**	**Olive**
13.15	**Überwurfmutter**	M 06-LL		452 801	E	0,001	**Union nut**	**Contre écrou**

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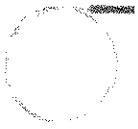

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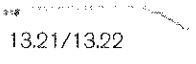

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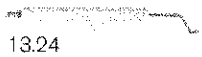

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Bild Pict. Photo	**Bezeichnung** Brenner-Typenreihe Burner serie Type brûleur		Größe Size Grand.	Bestell-Nr. Order-No. No de commande		ca. kg appr. kg env. kg	**Designation**	**Désignation**
	Düsenabschluß für Düse Monarch-Düsen						**Nozzle closure for nozzle**	**Blocage gicleur pour gicleur**
13.16	M, MS (zweistufig) 2,5 bar Steinen-Düsen		5-9	112 261 1016/2	E	0,011	Monarch nozzles Steinen nozzles	Gicleur Monarch Gicleur Steinen
13.17	M, MS (zweistufig) 2,5 bar		5-9	112 261 1017/2	E	0,012	(two stage)	(deux allures
	Heizpatrone M, MS (Z)						**Heating cartridge**	**Cartouche chauffante**
13.18	100 Watt, 220V		5-9	112 564 1005/2	E	0,082		
13.19	**Heizkörper** 100 Watt, RMS		7-11	112 574 1001/2	E	0,192	**Heating element**	**Résistance**
13.20	**Temperaturfühler**			112 564 1004/2	E	0,018	**Temperature sensor**	**Contact thermique**
	Zündelektroden						**Ignition electrode**	**Electrodes d'allumage**
13.21	L (Z)	links	5	111 564 1001/7	E	0,058	links = left	
		rechts		111 564 1002/7	E	0,057	rechts = right	
	L		5 LN	241 300 1018/7	E	0,050		
	L (Z) (Z/2)	links	7+8	111 764 1003/7	E	0,056		
		rechts		111 764 1004/7	E	0,057		
	L (Z)	links	9	211 163 1011/7	E	0,046		
		rechts		211 163 1012/7	E	0,046		
13.22	L (T) (T/2)	links	5-8	111 794 1004/7	E	0,057		
		rechts		111 794 1005/7	E	0,057		
	L (T)	links	9+10	111 994 1004/7	E	0,055		
		rechts		111 994 1005/7	E	0,056		
13.23	M/MS	links	5-9	212 163 1020/7	E	0,056		
		rechts		212 163 1021/7	E	0,058		
13.24	RL	links	5	121 364 1006/7	E	0,059		
		rechts		121 364 1007/7	E	0,059		
		links	7	211 404 1020/7	E	0,054		
		rechts		211 404 1021/7	E	0,054		
	RL 8-11, RMS 7-11	links		111 974 1007/7	E	0,090		
		rechts		111 974 1008/7	E	0,090		
	Befestigungsbügel						**Attachment bracket**	**Etrier de fixation**
13.25	für Zündelektroden			111 011 1012/7	E	0,013	for ignition electrode	pour électrodes d'allumage
13.26	**Druckring**, RMS		5-11	122 364 1001/7	E	0,002	**Pressure ring**	**Rondelle de pression**
13.27	**Halter**, schwarz		5 LN	241 300 1009/7	E		**Support**	**Support**
13.28	**Führungsrohr**		5 LN	211 364 1001/2	E		**Guiding tube**	**Tube guide**
13.29	**Gleitfolie**	7,8 x 134,8	5 LN	241 300 0102/7	E		**Foil sleeve**	**Coussinet**
13.30	**Stellhebel**	Oberteil	5 LN	241 400 1007/7	E		**Adjusting lever**	**Levier de réglage**
		Unterteil	5 LN	241 400 1006/7	E			
13.31	**Blende**		5 LN	211 364 1402/7	E		**Diaphragm**	**Diaphragme**
13.32	**Druckschlauch** DN 6, 450 lg, Edelstahl		5 LN	491 213	E		**Pressure hose**	**Contre écrou**
13.33	**Überwurfmutter** X M 08-LL		5 LN	452 816	E		**Union nut**	**Contre écrou**
13.34	**Schneidring** X D 08-LL		5 LN	452 809	E		**Cutting ring**	**Olive**

14.1

Bild Pict. Photo	**Bezeichnung** Brenner-Typenreihe Burner serie Type brûleur		Bestell-Nr. Order-No. No de commande			ca. kg appr. kg env. kg	**Designation**	**Désignation**
14.	**Düsen**						**Nozzles**	**Gicleurs**
14.1	**Düsen Fabrikat Monarch** Größe in US Gph bei 7 bar						**Monarch manufacture** Size in US Gph at 7 bar	**Fabrication Monarch** grandeur en US Gph à 7 bar
	Typ R - 45° Vollstrahl	3,50	602 314	E		0,027	Solid spray	Cône-plein
	Typ R - 60° Vollstrahl	3,50	602 366	E		0,027	Solid spray	Cône plein
	Typ PLP - 45° Halbstrahl	3,50	602 014	E		0,027	Semi-solid spray	Cône 1/2 creux
		4,00	602 015	E		0,027		
		4,50	602 016	E		0,027		
		5,00	602 017	E		0,027		
		5,50	602 018	E		0,027		
		6,00	602 019	E		0,027		
		6,50	602 020	E		0,027		
		7,00	602 021	E		0,027		
		7,50	602 022	E		0,027		
		8,50	602 023	E		0,027		
		9,50	602 024	E		0,027		
	Typ PLP - 60° Halbstrahl	3,50	602 215	E		0,027	Semi-solid spray	Cône 1/2 creux
		4,00	602 216	E		0,027		
		4,50	602 217	E		0,027		
		5,00	602 218	E		0,027		
		5,50	602 219	E		0,027		
		6,00	602 220	E		0,027		
		6,50	602 221	E		0,027		
		7,00	602 222	E		0,027		
		7,50	602 223	E		0,027		
		8,50	602 224	E		0,027		
		9,50	602 225	E		0,027		
		10,50	602 226	E		0,027		
		12,00	602 227	E		0,022		
		13,50	602 228	E		0,022		
		15,50	602 229	E		0,022		
		17,50	602 230	E		0,022		
		19,50	602 231	E		0,023		
		21,50	602 232	E		0,023		
		24,00	602 233	E		0,023		
		28,00	602 234	E		0,023		
		30,00	602 235	E		0,023		
		35,00	602 236	E		0,030		
		40,00	602 237	E		0,030		
		45,00	602 238	E		0,035		
		50,00	602 239	E		0,035		
		60,00	602 240	E		0,040		
	Typ HO - 45°Hohlstrahl	3,50	602 603	E		0,022	Hollow spray	Cône creux
		4,00	602 604	E		0,022		
		4,50	602 605	E		0,022		
		5,00	602 606	E		0,022		
		5,50	602 607	E		0,022		
		6,00	602 608	E		0,022		
		6,50	602 609	E		0,022		
		7,00	602 610	E		0,022		
		7,50	602 611	E		0,022		
		8,50	602 612	E		0,022		
		9,50	602 613	E		0,022		
		10,50	602 614	E		0,022		
		12,00	602 615	E		0,022		
		13,50	602 616	E		0,022		
		15,50	602 617	E		0,022		
		17,50	602 618	E		0,022		
		19,50	602 619	E		0,022		
		21,50	602 620	E		0,022		
		24,00	602 621	E		0,022		
		28,00	602 622	E		0,022		
		30,00	602 623	E		0,022		
	Typ HO - 60° Hohlstrahl	3,50	602 653	E		0,022	Hollow spray	Cône creux
		4,00	602 654	E		0,022		
		4,50	602 655	E		0,022		
		5,00	602 656	E		0,022		
		5,50	602 657	E		0,022		
		6,00	602 658	E		0,022		
		6,50	602 659	E		0,022		
		7,00	602 660	E		0,022		

14.2

Bild Pict. Photo	**Bezeichnung** Brenner-Typenreihe Burner serie Type brûleur		Bestell-Nr. Order-No. No de commande			ca. kg appr. kg env. kg	**Designation**	**Désignation**
	Typ HO - 60° Hohlstrahl	7,50	602 661	E		0,022	Hollow spray	Cône creux
		8,50	602 662	E		0,022		
		9,50	602 663	E		0,022		
		10,50	602 664	E		0,022		
		12,00	602 665	E		0,022		
		13,50	602 666	E		0,022		
		15,50	602 667	E		0,022		
		17,50	602 668	E		0,022		
		19,50	602 669	E		0,022		
		21,50	602 670	E		0,022		
		24,00	602 671	E		0,022		
		28,00	602 672	E		0,022		
		30,00	602 673	E		0,022		
14.2	**Düsen Fabrikat Steinen** Größe in US Gph bei 7 bar						**Steinen manufacture** Size in US Gph at 7 bar	**Fabrication Steinen** grandeur en US Gph à 7 bar
	Typ S - 45° Vollstrahl	3,50	612 021	E		0,025	Solid spray	Cône plein
		4,00	612 022	E		0,025		
	Typ S - 60° Vollstrahl	3,50	612 220	E		0,025	Solid spray	Cône plein
		4,00	612 221	E		0,025		
	Typ SS - 45° Halbvollstrahl	4,50	612 023	E		0,025	Semi-solid spray	Cône 1/2 creux
		5,00	612 024	E		0,025		
		5,50	612 025	E		0,025		
		6,00	612 026	E		0,025		
		6,50	612 027	E		0,025		
		7,00	612 028	E		0,025		
		7,50	612 029	E		0,025		
		8,00	612 030	E		0,025		
		9,00	612 032	E		0,025		
		10,00	612 034	E		0,025		
		11,00	612 035	E		0,025		
		12,00	612 036	E		0,021		
		13,00	612 037	E		0,021		
		14,00	612 038	E		0,021		
		15,00	612 039	E		0,021		
		16,00	612 040	E		0,021		
		18,00	612 041	E		0,021		
		20,00	612 042	E		0,021		
		22,00	612 043	E		0,021		
		24,00	612 044	E		0,021		
		26,00	612 045	E		0,021		
	Typ SS - 60° Halbvollstrahl	4,50	612 222	E		0,025	Semi-solid spray	Cône 1/2 creux
		5,00	612 223	E		0,025		
		5,50	612 224	E		0,025		
		6,00	612 225	E		0,025		
		6,50	612 226	E		0,025		
		7,00	612 227	E		0,025		
		7,50	612 228	E		0,025		
		8,00	612 229	E		0,025		
		9,00	612 231	E		0,025		
		10,00	612 233	E		0,025		
		11,00	612 234	E		0,025		
		12,00	612 235	E		0,021		
		13,00	612 236	E		0,021		
		14,00	612 237	E		0,021		
		15,00	612 238	E		0,021		
		16,00	612 239	E		0,021		
		18,00	612 240	E		0,021		
		20,00	612 241	E		0,021		
		22,00	612 242	E		0,021		
		24,00	612 243	E		0,021		
		26,00	612 244	E		0,021		
	Düsen Fabrikat Fluidics Größe in US Gph bei 8 bar						**Fluidics manufacture** Size in US Gph at 8 bar	**Fabrication Fluidics** grandeur en US Gph
14.3	**Typ H- 45°** Hohlstrahl	6,0	602 693	E		0,030	Hollow spray	à 8 bar, Cône creux
		6,5	602 694	E		0,030		
		7,0	602 695	E		0,030		
		7,5	602 696	E		0,030		
		8,0	602 697	E		0,030		

14.11

Bild Pict. Photo	Bezeichnung Brenner-Typenreihe Burner serie Type brûleur		Bestell-Nr. Order-No. No de commande		ca. kg appr. kg env. kg	Designation	Désignation
14.10	**Regeldüsen**					**Regulating nozzles**	**Gicleur à retour**
14.11	**Typ WB3, 45°**	15 kg/h	602 570	E	0,030		
		20 kg/h	602 571	E	0,030		
		25 kg/h	602 572	E	0,030		
		30 kg/h	602 573	E	0,030		
		35 kg/h	602 574	E	0,030		
		40 kg/h	602 575	E	0,030		
		45 kg/h	602 576	E	0,030		
		50 kg/h	602 577	E	0,030		
		55 kg/h	602 578	E	0,030		
		60 kg/h	602 579	E	0,030		
		65 kg/h	602 580	E	0,030		
		70 kg/h	602 581	E	0,030		
14.12	**Typ K3, 50°**	80 kg/h	602 558	E	0,030		
		90 kg/h	602 559	E	0,034		
		100 kg/h	602 560	E	0,034		
		110 kg/h	602 561	E	0,034		
		120 kg/h	602 562	E	0,034		
		130 kg/h	602 563	E	0,034		
		140 kg/h	602 564	E	0,034		
		150 kg/h	602 565	E	0,034		
		160 kg/h	602 566	E	0,034		
		170 kg/h	602 567	E	0,034		
		180 kg/h	602 568	E	0,034		
		200 kg/h	602 569	E	0,034		
14.13	**Typ W 50°, Serie 4** Hohlstrahl	40 kg/h	612 967	E	0,100		
		45 kg/h	612 988	E	0,100		
		50 kg/h	612 968	E	0,100		
		55 kg/h	612 989	E	0,100		
		60 kg/h	612 969	E	0,100		
		70 kg/h	612 970	E	0,103		
		80 kg/h	612 971	E	0,104		
		90 kg/h	612 972	E	0,104		
		100 kg/h	612 973	E	0,110		
		110 kg/h	612 974	E	0,110		
		125 kg/h	612 975	E	0,110		
		140 kg/h	612 976	E	0,110		
		160 kg/h	612 977	E	0,110		
		180 kg/h	612 978	E	0,110		
		200 kg/h	612 979	E	0,110		
		225 kg/h	612 980	E	0,110		
		250 kg/h	612 981	E	0,110		
		275 kg/h	612 982	E	0,110		
		300 kg/h	612 983	E	0,110		
		330 kg/h	612 984	E	0,110		
		360 kg/h	612 985	E	0,110		
		390 kg/h	612 990	E	0,110		
		420 kg/h	612 991	E	0,110		
		460 kg/h	612 992	E	0,110		
14.14	**Typ W 50°, Serie 5** Halb-Hohlstrahl	40 kg/h	612 801	E	0,100		
		45 kg/h	612 802	E	0,100		
		50 kg/h	612 803	E	0,100		
		55 kg/h	612 804	E	0,103		
		60 kg/h	612 805	E	0,104		
		70 kg/h	612 806	E	0,104		
		80 kg/h	612 807	E	0,110		
		90 kg/h	612 808	E	0,110		
		100 kg/h	612 809	E	0,110		
		110 kg/h	612 810	E	0,110		
		125 kg/h	612 811	E	0,110		
		140 kg/h	612 812	E	0,110		
		160 kg/h	612 813	E	0,110		
		180 kg/h	612 814	E	0,110		
		200 kg/h	612 815	E	0,110		
		225 kg/h	612 816	E	0,110		
		250 kg/h	612 817	E	0,110		
		275 kg/h	612 818	E	0,110		
		300 kg/h	612 819	E	0,110		
		330 kg/h	612 820	E	0,110		
		360 kg/h	612 821	E	0,110		
		390 kg/h	612 822	E	0,110		
		420 kg/h	612 823	E	0,110		
		460 kg/h	612 824	E	0,110		

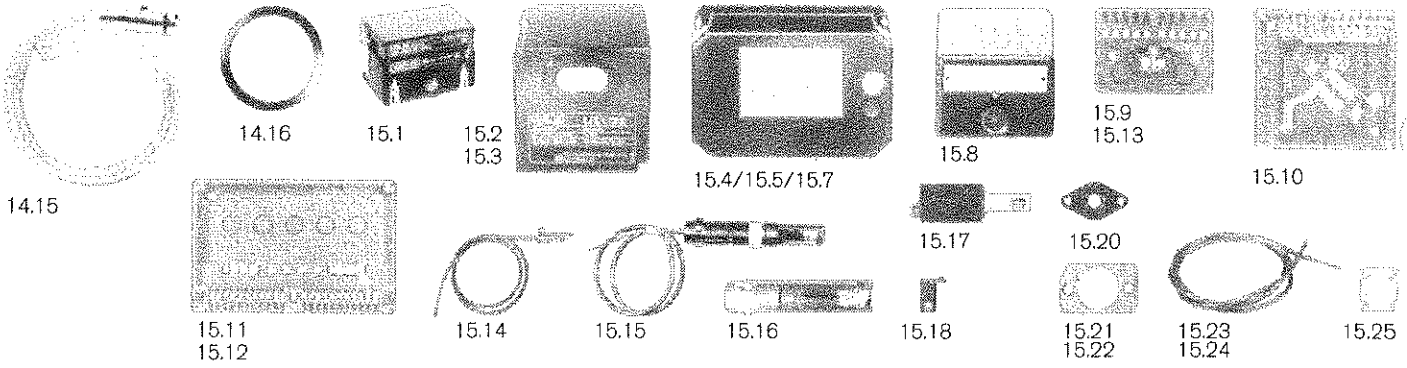
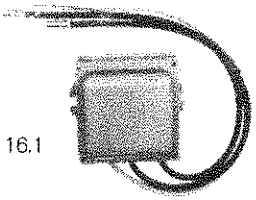


Bild Pict. Photo	**Bezeichnung** Brenner-Typenreihe Burner serie Type brûleur	Bestell-Nr. Order-No. No de commande		ca. kg appr. kg env. kg	**Designation**	**Désignation**
14.15	**Anschlußschlauch** komplett für Öldurchsatzmessung für RL-Brenner mit Regeldüse	111 574 0001/2	E	0,382	**Connection hose** compl. for oil througput determination for RL burners with regulating nozzle	**Flexible** complét pour mesure du débit sur gicleur à retour
14.16	**O-Ring** 7 x 1,5 aus Viton für Regeldüse W	445 040	Z	0,002	**O-Ring** 7 x 1,5 made of Viton for regulating nozzle	**Joint O** en viton pour gicleur à retour
14.17	**Siebfilter** für Regeldüse (ohne Bild)				**Screen filter** for regulating nozzle (without pict.)	**Filtre en tamis** pour gicleur a retour (s. photo)
	80 Maschen bis 125 kg/h, Düse W	612 966	E	0,017	80 meshes up to 125 kg/h	80 Mailles àe 125 kg/h
	40 Maschen ab 140 kg/h, Düse W	612 965	E	0,017	40 meshes from 140 kg/h	40 Mailles de 140 kg/h
	80 Maschen für Düse K3 über 70kg/h	602 543	E	0,004	80 meshes for nozzle	80 Mailles pour gicleur
	120 Machen für DüseWB3 bis 70kg/h	602 544	E	0,006	120 meshes for nozzle	120 Mailles pour gicleur
15.	**Feuerungsautomaten** Preise für Sonderspannungen auf Anfrage				**Burner controls** Price for special voltages on inquiry	**Coffret de sécurité** Prix pour tension speciale sur demande
	Feuerungsautomat, 220-240V				**Burner control**	**Coffret de sécurité**
15.1	**LOA 24.171** 50-60 Hz	600 206	E	0,180		
	LOA 25.173 50-60 Hz	600 208	E	0,184		
	LOA 44.252 50-60 Hz	600 213	E	0,140		
15.2	**LAL 2.14** 50-60 Hz	600 175	E	1,000		
	LAL 2.25 50-60 Hz	600 177	E	0,892		
	LAL 2.65 50-60 Hz	600 178	E	1,000		
	LAL 3.25 50-60 Hz	600 179	E	1,040		
15.3	**LFL 1.122** 50-60 Hz	600 161	E	1,000		
	LFL 1.322 50-60 Hz	600 163	E	1,000		
	LFL 1.335 50-60 Hz	600 172	E	1,000		
	LFL 1.622 50-60 Hz	600 165	E	1,000		
	LFL 1.635 50-60 Hz	600 174	E	1,000		
15.4	**LOK 16.250** 50-60 Hz	600 192	E	0,989		
	LOK 16.650 50-60 Hz	600 220	E	1,000		
15.5	**LGK 16.122** 50-60 Hz	600 200	E	0,986		
	LGK 16.322 50-60 Hz	600 195	E	0,990		
	LGK 16.622 50-60 Hz	600 201	E	0,992		
15.6	**Steckerkabel AGM19** für LGK16/QRA55	600 579	E	0,341	**Cable AGM19**	**Câble AGM19**
	Steuergerät, 220-240 V				**Program mechanism**	**Progammateur**
15.7	**LEC1** 50 Hz	600 124	E	1,530		
	LEC1 60 Hz	600 125	E	1,530		
15.8	**Flammenwächter,** 220-240 V				**Flame detector**	**Détecteur de flamme**
	LAE10 50-60 Hz	600 118	E	0,310		
	LFE10 50-60 Hz	600 121	E	0,400		
15.9	**Klemmensockel** **LOA**	600 527	E	0,070	**Terminal socket**	**Bornier socle**
15.10	**LFL**	600 516	E	0,160		
	LAL	111 552 1203/7	E	0,164		
	LAL	600 517	E	0,164		
15.11	**LOK**	600 521	E	0,120		
	LGK	600 523	E	0,166		
15.12	**LEC**	600 509	E	0,350		
15.13	**LAE/LFE**	600 511	E	0,080		
	Flammenfühler				**Flame feeler**	**Sonde de ionisation**
15.14	**QRB1** (Kabel 800 mm)	111 964 1201/2	E	0,030		
	QRB1 C (NA)	211 364 1201/2	E	0,030		
15.15	**RAR7**(Selenzelle)	111 974 1201/2	E	0,089	(Selenium cell)	(Cellule)
	RAR8	110 564 1201/2	E	0,091		
	UV-Fühler für QRA55	600 587	E	0,005		
15.16	**QRA**(UV-Zelle)	600 501	E	0,032	(UV-Cell)	(Cellule UV)
15.17	**QRA 55** C27 (UV-Zelle)	600 578	E	0,485		
	QRA 55 D27	600 642	E	0,485		
15.18	**Bride** für QRB1	600 566	E	0,002	**Flange** for	**Bride** pour
15.19	QRA und RAR	600 601	E	0,009		
15.20	**Flansch** für QRB1	600 564	E	0,003	**Holder** for	**Support** pour
15.21	QRA und RAR (gewölbt)	600 600	E	0,019		
15.22	(flach)	600 602	E	0,007		
15.23	**Anschlußkabel** für QRA	155 313 1201/7	E	0,033	**Connect. cable** for QRA	**Câble** pour QRA,
15.24	RAR	111 974 1201/7	E	0,089	for burner control	pour coffret de sécurité
15.25	**Verschraubung** PG 13,5	730 002	E	0,022	**Cable screwing**	**Presse étoupe**
	PG 16 x 6-14	730 004	E	0,029		


16.1


16.2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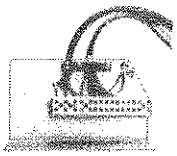
16.9

Bild Pict. Photo	**Bezeichnung** Brenner-Typenreihe Burner serie Type brûleur	Größe Size Grand.	Bestell-Nr. Order-No. No de commande		ca. kg appr. kg env. kg	**Designation**	**Désignation**
16.	**Zündtrafo**					**Ignition transformers**	**Transformateur d'allumage**
	Zündtrafo, 230V/50-60 Hz (2 x 5000V)					**Ignition transformers**	**Transformateur**
16.1	L, G, GL	5-8	603 100	E	2,120		
	RL, RGL	5-7					
	L	5 LN	603 075	E	2,000		
	G (1 x 5000V)	5/7-NA	603 077	E	0,946		
16.2	**Zündtrafo** (2 x 7000 V mit 100% ED)						
	L	9-10 T	603 112	E	6,140		
	RL, RGL	8-11					
	M	5					
	MS	7-9					
	RMS	7-11					
	G, GL, RGMS	9-11					
	Trafobügel					**Attachment bracket**	**Etrier de fixation**
16.3	L	5-7					
	G,GL,RGL	5-7	111 211 1102/7	E	0,140		
	G	5/7-NA	251 103 1101/7	E	0,122		
16.4	G,GL,RGL	7-11	151 907 1101/7	E	0,169		
16.5	**Tülle** LW Ø 8		756 122	E	0,003	**Bushing**	**Passage**
16.6	**Dichtungstülle**		111 351 0010/7	E	0,008	**Sealing sleeve**	**Presse étoupe**
16.7	**Zündleitung** (ohne Bild)					**Ignition cables**	**Câbles d'allumage**
	Preis pro Meter PVC-schwarz		743 200	E	0,056	Price per meter	Prix du mètre
	Preis pro Meter Silikon rot (auch für Ionisation)		743 202	E	0,048	(without picture)	(sans photo)
16.8	**Steckerkupplung**		716 018	E	0,014	**Plug coupling**	**Fiche embrochable**
16.9	**Zündstecker**		716 017	E	0,019	**Ignition plug**	**Prise d´allumage**
16.10	**Zündkabelstecker** G	5/7-NA	794 005	E	0,003	**Ignition cable plug**	**Prise câble d´allumage**
16.11	**Zündkabel** 490 mm	7 NA	111 151 5716/2	E		**Ignition cable**	**Câble d´allumage**
	750 mm	5 LN	240 300 1107/2	E			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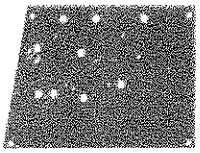
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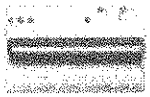
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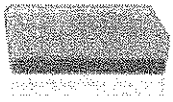
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Bild Pict. Photo	Bezeichnung Brenner-Typenreihe Burner serie Type brûleur	Größe Size Grand.	Bestell-Nr. Order-No. No de commande			ca. kg appr. kg env. kg	Designation	Désignation
17.	**Einbauklemmleiste**						**Terminals incorporation box**	**Bornier de raccordement**
17.1	**Einbauklemmleiste** komplett für Öl-, Gas- und Zweistoffbrenner ohne Schalteinrichtung. Bei Bestellung Brennertype und Spannung angeben.		auf Anfrage				**Terminals incorporation box,** complete for oil-, gas- and dual fuel burners without switching equipment. When ordering indicate burner type and voltage.	**Bornier** complet pour brûleurs fuel, gaz et mixte sans commande incorporée. Lors de commande preciser le type du brûleur et la tension.
17.2	**Einbauschaltteil** komplett für G5-7. Bei Bestellung Brennertype und Spannung angeben.		auf Anfrage				**Built in switching component** complete, for G5-7 when ordering indicate burner type and voltage.	**Commande incorporée** complet pour G5-7 lors de commande préciser le type du brûleur et la tension.
17.3	**Einbauschaltteil** komplett für Ölbrenner. Bei Bestellung Brennertyp und Spannung angeben.		auf Anfrage				**Switching equipment** complete for oil burners When ordering indicate burner type and voltage.	**Commande incorporée** complet pour brûleur fuel inquer le type du brûleur et la tension.
	Abdeckplatte						**Cover plate**	**Tôle protectrice**
17.4	L,G,GL,RL,RGL	5	111 552 0106/2	E		0,752		
	L,MS,G,GL,RL,RGL,RMS	7-8	111 652 0105/2	E		0,860		
	L	9	111 964 2207/2	E		1,466		
17.5	L,G,MS	9-11	111 974 0106/2	E		1,733		
17.6	**Einbauklemmleiste,** G						**Terminal strip**	**Bornier de raccordement**
	22-polig	5	111 564 1707/2	E		1,540	22-pole	22-pôles
	28-polig	5-8	151 516 1702/2	E		0,734	28-pole	28-pôles
	38-polig	5-8	111 574 1710/2	E		0,781	38-pole	38-pôles
	41-polig	9-11	111 974 1716/2	E		0,947	36-pole	36-pôles
	41-polig	9-11	157 518 1704/2	E		0,835	45-pole	45-pôles
	Klemmleisten						**Terminal strip**	**Bornier**
17.7	2-polig		735 078	E		0,013	2-pole	2-pôles
	12-polig		735 077	E		0,069	12-pole	12-pôles
	Montagebügel für Schaltteil						**Installation bracket**	**Etrier pour bornier**
17.8	L,MS,G	5	111 564 2204/7	E		0,200	for switching equipment	
17.9	L,MS	7-8	111 764 2204/7	E		0,240		
	L,MS,RL,RMS,G,GL,RGL, für Klemmleiste	5-11	111 564 1703/7	E		0,321	for terminal strip	
17.10	**Platte** (ohne Bild)		151 101 0108/7	E		0,150	**Plate** (without picture)	**Plaque** (sans photo)
	Befestigungsschelle						**Cable clamp**	**Collier pour câble**
17.12	H 3 P		790 252	E		0,001		
	H 4 P		790 253	E		0,001		
	H 5 P		790 254	E		0,001		
	H 6 P		790 255	E		0,001		
	H 7 P		790 270	E		0,001		
	Beschriftungsleiste						**Lettering strip**	**Etiquette à bornier**
17.13	12-polig		736 196	E		0,002	12-pole	12-pôles
	20-polig		736 197	E		0,003	20-pole	20-pôles
	Krallenscheibe						**Toothed arresting disk**	**Rondelle éventail**
17.14	M4		431 900	Z		0,001		
17.15	**Spreizniet** SN 2001		736 038	E		0,001	**Spreader rivet**	**Rivet**


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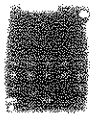
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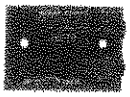
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Bild Pict. Photo	**Bezeichnung** Brenner-Typenreihe Burner serie Type brûleur	Größe Size Grand.	Bestell-Nr. Order-No. No de commande		ca. kg appr. kg env. kg	**Designation**	**Désignation**
17.16	**Überstromrelais** (ohne Bild) Bei Bestellung Brennertype, Motortype, Stromstärke und Spannung angeben.		auf Anfrage			**Overload relay** (without picture) When ordering indicate burner type, motor type, amperage and voltage.	**Relais** (sans photo) Préciser le type du brûleur moteur, intensité et tension.
	Leistungsschütz 230/380V, 50-60 Hz					**Air break contactor**	**Contacteur**
17.17	B 9 - 30 - 10		701 897	E	0,310		
	B12 - 30 - 10		701 901	E	0,307		
	B12 - 30 - 22		701 903	E	0,346		
	B16 - 30 - 32		701 908	E	0,354		
	B16 - 30 - 10		701 905	E	0,305		
	B25 - 30 - 10		701 898	E	0,460		
	B30 - 30 - 22		701 900	E	0,588		
17.18	**Hilfsschütz N22 E** 2 S + 2 Ö		701 930	E	0,305	**Auxiliary contactor**	**Relais auxiliaire**
17.19	**Schalter** 1300 Ziffer 1		700 914	E	0,010	**Switches**	**interrupteur**
	1302 Ziffer 2		700 916	E	0,012		
	1312 1-2 gelb		700 932	E	0,012		
17.20	**Zeitzähler** 50 Hz		709 574	E	0,044	**Service hours counter**	**Compteur d'heures**
	60 Hz		709 575	E	0,044		
17.21	**Temperaturregler Typ ROB** 220-240V/50-60 Hz, 65-130°C	5-11	691 120	Z	0,189	**Temperature controller ROB type**	**Regulateur de temperature ROB**

Bild Pict. Photo	Bezeichnung Brenner-Typenreihe Burner serie Type brûleur		Größe Size Grand.	Bestell-Nr. Order-No. No de commande			ca. kg appr. kg env. kg	Designation	Désignation
17.50	**Anschlußkabel**							**Connection cable**	**Câble raccordement**
	Brenner - Endschalter, 2 x 0,75							Burner - limit switch	Brûleur-contact de bride
17.51	L, M, MS und		5 - 9						
	RL, RMS und		5 - 11						
	G, GL und		5 - 10						
	RGL und RGMS	750	9 - 11	111 974 1201/7	E		0,089		
	Ölvorwärmer - Einbauschaltteil für Steuerung							Oil preheater - Switching equipment for control	Réchauffeur - commande incorporée pour commande
17.52	M	980	5	212 364 2204/2	E		0,180		
	MS	1040	7 + 8	112 762 0003/2	E		0,160		
	für Heizung							for heating	pour puissance
17.53	M	1140	5	112 552 0013/2	E		0,152		
	MS	1110	7 + 8	112 762 0002/2	E		0,240		
	Ölvorwärmer - Einbauklemmleiste für Steuerung M, MS, RMS							Oil preheater - Terminals incorporation box for côntrol	Réchauffeur - bornier sans commande incorporée pour contrôle
		6 x 1,5 x 1100	5-8	112 964 0002/2	E		0,175		
		6 x 1,5 x 1300	9-10	112 964 1718/2	E		0,214		
		6 x 1,5 x 1320	11	112 882 0004/2	E		0,214		
17.54	für Heizung							for heating	pour puissance
	M	4 x 2,5 x 1140	5	112 552 0013/2	E		0,152		
	MS, RMS	4 x 4 x 1100	7-8	112 652 0003/2	E		0,237		
	MS, RMS	4 x 4 x 1300	9-10	112 964 1717/2	E		0,348		
	RMS	4 x 6 x 1400	11	182 174 0005/2	E		0,530		

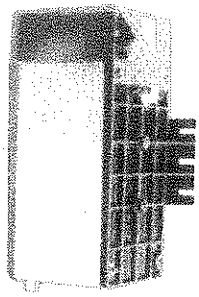









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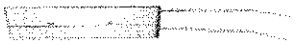
Bild Pict. Photo	**Bezeichnung** Brenner-Typenreihe Burner serie Type brûleur			Bestell-Nr. Order-No. No de commande			ca. kg appr. kg env. kg	**Designation**	**Désignation**
18.	**Ölvorwärmer EV2B-D**							**Oil preheater EV2B-D**	**Réchauffeurs EV2B-D**
	Bei Bestellung Spannung angeben							When ordering indicate voltage	à la commande indiquer la tension
	Ölvorwärmer komplett, jedoch ohne Ölabgang Type							**Oil preheater complete** however without oil outlet Type	**Réchauffeur complét** sans départ fuel Type
18.1	**EV2B/01**	-80°C	380/400V	511 221 0101/0	E		16,400		
	EV2B/01	80-100°C	380/400V	511 222 0101/0	E		16,400		
	EV2B/01	100-160°C	380/400V	511 220 0101/0	E		14,539		
	EV2C	-80°C	380/400V	511 231 0100/0	E		14,760		
	EV2C	80-100°C	380/400V	511 232 0100/0	E		14,760		
	EV2C	100-160°C	380/400V	511 230 0100/0	E		14,760		
	EV2D	-80°C	380/400V	511 241 0100/0	E		23,880		
	EV2D	80-100°C	380/400V	511 242 0100/0	E		23,880		
	EV2D	100-160°C	380/400V	511 240 0100/0	E		23,880		
	Ölvorwärmer in Schiffsausführung Typ							**Oil preheater** marine execution Type	**Réchauffeur** exécution maritime Type
18.101	**EV2B/01**	380/400V		511 225 0101/0	E		16,400		
	EV2B/01	240/415V		511 225 3101/0	E		16,400		
	EV2B/01	254/440V		511 225 4101/0	E		16,400		
	EV2C	380/400V		511 235 0100/0	E		15,800		
	EV2C	240/415V		511 235 3100/0	E		15,800		
	EV2C	254/440V		511 235 4100/0	E		15,800		
	EV2D	380/400V		511 245 0100/0	E		26,960		
	EV2D/R	380/400V	liegend angeb.	511 246 0100/0	E		26,060		
	EV2D	240/415V		511 245 3100/0	E		27,000		
	EV2D/R	240/415V	liegend angeb.	511 246 3100/0	E		25,870		
	EV2D	254/440V		511 245 4100/0	E		26,980		
	EV2D/R	254/440V	liegend angeb.	511 246 4100/0	E		26,310		
	Temperaturregler							**Temperature regulator**	**Regulateur de temperature**
18.2	**RAG4/6360**	20- 90°C		690 051	Z		0,140		
	RAG4/6331	60-130°C		690 048	Z		0,136		
	RAG4/6330	90-160°C		690 045	Z		0,142		
	Temperaturschalter für Brennerfreigabe							**Temperature switch for burner release**	**Thermostat à minimum**
18.3	F 55 - 17 (EV1B)			690 166	Z		0,004		
	F 65 - 17 (EV2A/B/C/D)			690 167	Z		0,004		
18.4	**Anschlußlitze** für EV2B-D			0511 210 002/2	E		0,003	**Connection cable**	**Câble**
18.5	**Halter** für EV2B-D			0533 001 003/7	E		0,003	**Holder**	**Support**
18.6	**Scheibe**			0533 001 006/7	E		0,002	**Disk**	**Rondelle**
	Temperaturbegrenzer							**Temperature limiter**	**Limiteur de temperature**
18.7	L135			690 172	Z		0,005		
	L170 (EV2D)			690 173	Z		0,005		
18.9	**Halter für Temperaturbegrenzer** für EV2D			0511 240 010/7	E		0,010	**Holder for temperature limiter**	**Support pour limitateur de température**
18.10	**Befestigungsschelle** für EV2D			0511 240 006/7	E		0,006	**Attachment clamp**	**Collier de fixation**
18.11	**Verschraubung**	PG 13,5 für EV2C-D		730 111	E		0,022	**Screwing**	**Presse étoupe**
		PG11 für EV2B-D		730 110	E		0,016		
18.12	**Sechskantmutter** MPg 13,5			730 405	E		0,003	**Locknut**	**Contre-écrou**
18.13	**Reduktion** HPg 13,5-Pg 11			730 451	E		0,005	**Reducing**	**Réducteur**
	Haube							**Cover**	**Capot**
18.14	für EV2B-EV2C			0511 220 003/2	E		0,520		
	für EV2D			0511 240 003/7	E		0,444		
	Haube für Vorw. in Schiffsausführung							**Cover** for preheater in marine execution	**Capot** pour réchauffeur en exécution maritime
18.15	EV2B/C			0511 220 002/2	E		0,520		
	EV2D			0511 240 002/2	E		0,440		



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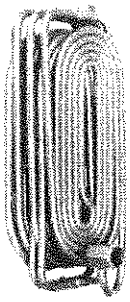

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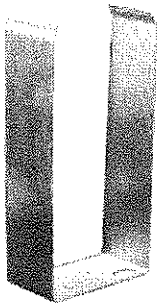

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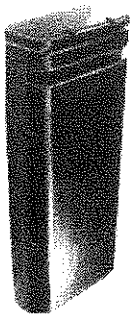
Bild Pict. Photo	**Bezeichnung** Brenner-Typenreihe Burner serie Type brûleur			Bestell-Nr. Order-No. No de commande			ca. kg appr. kg env. kg	**Designation**	**Désignation**
	Heizeinsätze							**Heating elements** (for mains voltage 220V)	**Eléments chauffants** (pour voltage 220V)
18.16		Volt	Watt						
	EV2B	230	1500	0511 230 102/2	E		0,878		
		240	1500	0511 220 107/2	E		0,889		
		254	1500	0511 220 105/2	E		0,878		
		290	1500	0511 220 104/2	E		0,857		
	EV2C, EV2D	230	2200	0511 210 101/2	E		0,893		
		240	2200	0511 210 107/2	E		0,880		
		254	2200	0511 220 102/2	E		0,907		
		290	2200	0511 220 103/2	E		0,868		
	Heizeinsätze für Schiffsausführung							**Heating elements**	**Eléments chauffants**
18.17	EV2B	230	1500	0511 220 108/2	E		1,065		
		240	1500	0511 220 110/2	E		1,063		
		254	1500	0511 220 109/2	E		1,045		
	EV2C, EV2D	230	2200	0511 210 105/2	E		1,092		
		240	2200	0511 210 109/2	E		1,066		
		254	2200	0511 210 108/2	E		1,082		
18.18	**Kabelschuh** (AMP), M5, für EV2B-EV2D			794 400	E		0,001	**Cable socket**	**Cosses**
18.19	**Isolierschlauch** (2 Stück erforderlich) (ohne Bild)			0511 210 006/7	E		0,001	**Isolation hose** (without picture)	**Flexibles d'isolement** (sans photo)
	Ölwendel komplett							**Oil coil** complete	**Serpentin** complét
18.20	EV2B			0511 220 111/2	E		5,200		
	EV2C			0511 230 101/2	E		5,120		
	EV2D			0511 240 101/2	E		10,320		
18.21	**Dessinblech**							**Design sheet**	**Tôle d'habillage**
	EV2B			0511 230 103/7	E		0,232		
	EV2C			0511 220 111/7	E		0,420		
	EV2D			0511 240 103/7	E		0,400		
	EV2D (Schiffsausführung)			0511 240 111/7	E		0,920		
18.22	**Umbausatz** (o. Bild)							**Alteration set**	**Jeux de transformation**
	Temperaturbegrenzer L 135			511 201 0001/2	E		0,016		
	Temperaturbegrenzer L 170			511 201 0002/2	E		0,025		



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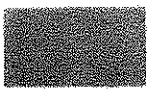

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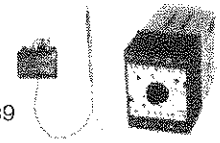

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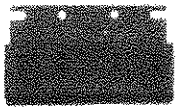

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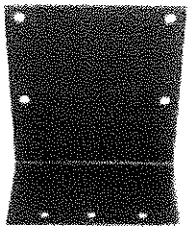

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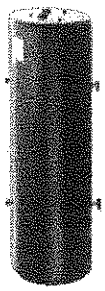
Bild Pict. Photo	Bezeichnung Brenner-Typenreihe Burner serie Type brûleur			Bestell-Nr. Order-No. No de commande		ca. kg appr. kg env. kg	Designation	Désignation
18.30	**Ölvorwärmer WEV 2.2/01 und WEV 3/01**						**Oil preheater WEV 2.2/01 and WEV 3/01**	**Réchauffeurs WEV 2.2/01 et WEV 3/01**
18.31	**WEV 2.2/01**	380/400V		512 220 0102/0	E	26,500		
		240/415V		512 220 3102/0	E	26,500		
		254/440V		512 220 4102/0	E	26,500		
		290/500V		512 220 5102/0	E	26,500		
18.32	**WEV 3/01**	380/400V		512 300 0102/0	E	45,500		
		240/415V		512 300 3102/0	E	46,000		
		254/440V		512 300 4102/0	E	46,000		
		290/500V		512 300 5102/0	E	46,000		
	Ölvorwärmer WEV 2.2/01 und WEV 3/01 in Schiffsausführung						**Oil preheater in marine execution**	**Réchauffeur exécution maritime**
18.33	**WEV 2.2/01** (mit Schlauchverschraubung)							
		380/400V		512 225 0102/0	E	26,550		
		254/440V		512 225 4102/0	E	26,500		
		290/500V		512 225 5102/0	E	26,550		
18.34	**WEV 2.2/01** (mit Schiffsverschraubung)							
		380/400V		512 229 0102/0	E	28,400		
		254/440V		512 229 4102/0	E	28,400		
18.35	**WEV 3/01** (mit Schlauchverschraubung)							
		380/400V		512 305 0102/0	E	46,200		
		254/440V		512 305 4102/0	E	46,200		
		290/500V		512 305 5102/0	E	46,200		
18.36	**WEV 3/01** (mit Schiffsverschraubung)							
		380/400V		512 309 0102/0	E	45,700		
		254/440V		512 309 4102/0	E	46,100		
		290/500V		512 309 5102/0	E	46,100		
	Heizkörper						**Heating body**	**Corps chauffant**
18.37	**WEV 2.2/01**	230V	6900 W	512 210 0122/7	E	0,757		
		240V	6900 W	512 210 0128/7	E	0,768		
		254V	6900 W	512 210 0123/7	E	0,795		
		290V	6900 W	512 210 0124/7	E	0,785		
18.38	**WEV 3/01**	230V	5600 W	512 300 0126/7	E	0,630		
		240V	5600 W	512 300 0132/7	E	0,630		
		254V	5600 W	512 300 0127/7	E	0,630		
		290V	5600 W	512 300 0128/7	E	0,630		
18.39	**Temperaturbegrenzer** EMF-5U			691 115	Z	0,113	**Temperature limiter**	**Limitateur de temperature**
18.40	**Temperaturregler** CROw-54/2			691 116	Z	0,460	**Temperature regulator**	**Regulateur de temperature**
18.41	**Fühler** PT100			512 210 0141/7	E	0,012	**Sensor** PT100	**Sonde** PT100
18.42	**Halter** für Temperaturbegrenzer			512 210 0142/7	E	0,006	**Holder**	**Support**
18.43				512 210 0118/2	E	0,014		
18.44	**Bügel** WEV 2.2/01, WEV3/01, RMS 7-11			112 874 0102/7	E	2,621	**Bracket**	**Etrier**
18.45	**Bügel** WEV 2.2/01 für RMS9, RMS10			112 964 0101/7	E	2,449	**Bracket**	**Etrier**



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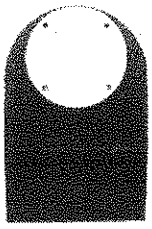

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Bild Pict. Photo	Bezeichnung Brenner-Typenreihe Burner serie Type brûleur	Bestell-Nr. Order-No. No de commande			ca. kg appr. kg env. kg	Designation	Désignation
18.50	**Ölvorwärmer MV9C, MV10A und MV10B**					**Oil preheater MV9C, MV10A and MV10B**	**Réchauffeur MV9C, MV10A et MV10B**
	Ölvorwärmer, ohne Anschlußteile und ohne Armaturen					Oil preheater, without connection parts and without armatures	**Réchauffeurs,** sans raccords et sans accessoires
18.51	**MV9C**	523 930 0102/0	E		38,340		
18.52	**MV10A**	543 010 0100/0	E		74,200		
18.53	**MV10B**	543 020 0001/0	E		63,400		
18.54	**Kugelhahn** ND64, PN100 M18 x 1,5	454 040	Z		0,727	**Ball cock**	**Robinet à bille**
	G 1/2", PN 250	454 181	Z		0,805		
18.55	**Thermometer** 0-160°C	642 009	Z		0,085	**Thermometer**	**Thermomètre**
18.56	**Einschraubstutzen** M 18 x 1,5 G1/2 x 41 für Thermometer	585 101 0002/7	E		0,095	**Adapter** for thermometer	**Raccord** pour thermomètre
18.57	**Schneidring** (ohne Bild) DPR 12-L	452 773	Z		0,003	**Cutting ring** (without picture)	**Rondelle** (sans photo)
18.58	**Überwurfmutter** (ohne Bild) M12-L	452 836	Z		0,025	**Union nut** (without picture)	**Raccord union** (sans photo)
18.59	**Temperaturregler ATH-2** 50-250°C Fühlerlänge 280 mm	690 247	Z		0,467	**Temperature regulator**	**Régulateur de température**
18.60	**Temperaturregler AMTHFS-23** 50-250°C Fühlerlänge 100 mm	690 248	Z		0,489	**Temperature regulator**	**Régulateur de température**
18.61	**Einschraubstutzen** 22 x G1/2" x 52	122 364 0070/7	E		0,093	**Threaded bush**	**Douille filetée**
18.62	**Reduzierschraube** M20 x 1,5 x M12	0523 920 006/7	E		0,026	**Reducing screw**	**Vis de régulation**
18.63	**Befestigungsbügel** M5Z	110 564 0101/2	E		6,380	**Attachment bracket**	**Etrier de fixation**
18.64	**Bügel** MS7-RMS8	110 764 0101/2	E		12,840	**Bracket**	**Etrier**
18.65	MS9-RMS10	110 964 0102/2	E		15,220		
18.66	RMS11	180 174 0103/2	E		18,180		

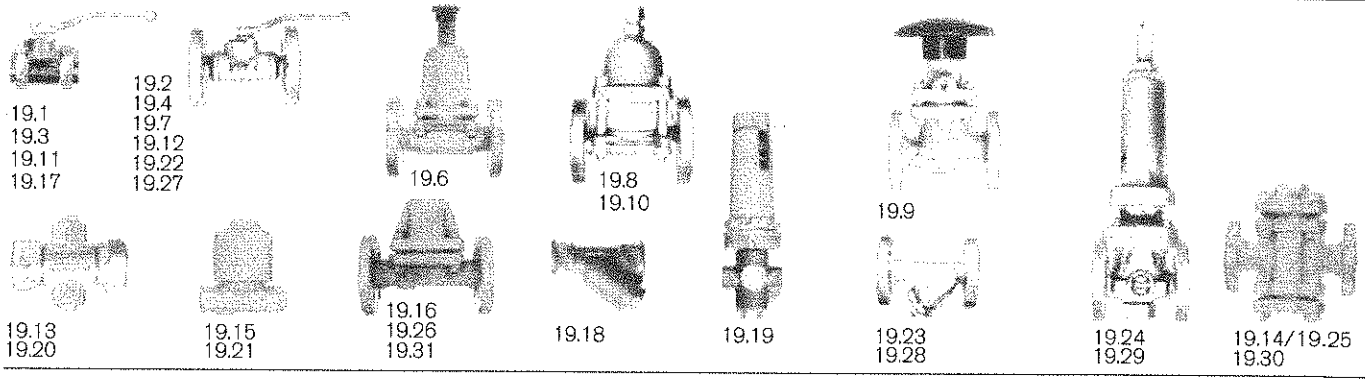

Bild Pict. Photo	Bezeichnung Brenner-Typenreihe Burner serie Type brûleur		MV Größe Size Grand.	Bestell-Nr. Order-No. No de commande		ca. kg appr. kg env. kg	Designation	Désignation
19.	**Armaturen für Medium-Ölvorwärmer mit nachgeschaltetem Elektro-Vorwärmer**						**Valve train for medium oil pre-heater with added electric preheater**	**Tuyauterie et raccord pour réchauffeur à fluide avec réchauffeur électrique en série**
	Warmwasser bis 110°C						**Warm water up to 110°C**	**Eau chaude jusqu'à 110°C**
19.1	Kugelhahn	G 1/2"	9 +10	454 188	Z	0,807	Ball cock	Robinet à bille
19.2		DN 15	9 +10	454 191	Z	2,440		
	Heißwasser über 110-180°C						**Hot water above 110-180°C**	**Eau surchauffée 110-180°C**
19.3	Kugelhahn	G 1/2"	9 +10	454 188	Z	0,807	Ball cock	Robinet à bille
19.4		DN 15	9 +10	454 191	Z	2,440		
		DN 20	9 +10	454 192	Z	3,480		
19.6	Regler für Heißwasser	DN 20	9 +10	690 017	Z	5,300	Regulator for hot water	Régulateur eau chaude
	Wärmeträgeröl bis 250°C						**Heat carrier oil up to 250°C**	**Thermofluide 250°C max.**
19.7	Kugelhahn	DN 15	9	454 191	Z	2,440	Ball cock	Robinet à bille
		DN 20	10	454 192	Z	3,480		
19.8	Regler für Wärmeträgeröl	DN 15	9	690 019	Z	4,460	Regulator for heat	Régulateur d'huile
		DN 20	10	690 021	Z	5,480	carrier oil	
	Wärmeträgeröl bis 300°C						**Heat carrier oil up to 300°C**	**Thermofluide 300°C max.**
19.9	Faltenbalgventil	DN 15	9 +10	454 138	Z	3,800	Bellows valve	Vanne à soufflet
19.10	Regler für Wärmeträgeröl	DN 15	9 +10	690 019	Z	4,460	Regulator for heat carrier oil	Régulateur pour huile
	Niederdruckdampf bis 0,5 bar und Hochdruckdampf bis 1,5 bar						**Low pressure steam up to 0,5 bar High pressure steam up to 1,5 bar**	**Vapeur basse pression jusqu'à 1,5 bar Vapeur haute-pression jusqu'à 1,5 bar**
19.11	Kugelhahn	G 1/2"	9 +10	454 188	Z	0,807	Ball cock	Robinet à bille
19.12		DN 15	9 +10	454 191	Z	2,440		
19.13	Kondensatkontrollgerät	G 1/2"	9 +10	699 021	Z	3,020	Condensate checking device	Contrôleur de condensat
19.14		DN 15	9 +10	699 022	Z	6,200		
19.15	Kondensatableiter	Rp 1/2"	9 +10	499 038	Z	1,780	Condensate trap	Organe d'évacuation
19.16		DN 15	9 +10	499 039	Z	3,900		
	Hochdruckdampf über 1,5-15 bar						**High pressure steam above 1,5-12 bar**	**Vapeur haute-pression sup. 1,5-12 bars**
19.17	Kugelhahn	G 1/2"	9 +10	454 188	Z	0,807	Ball cock	Robinet à bille
19.18	Schmutzfänger	G 1/2"	9 +10	499 084	Z	0,420	Dirt trap	Tamis
19.19	Druckregler	Rp 1/2"	9 +10	605 354	Z	2,060	Steam pressure regulator	Rég. vapeur
19.20	Kondensatkontrollgerät	G 1/2"	9 +10	699 021	Z	3,020	Condensate checking device	Contrôleur de condensat
19.21	Kondensatableiter	Rp 1/2"	9 +10	499 038	Z	1,780	Condensate trap	Organe d'évacuation
	Hochdruckdampf über 6-20 bar						**High pressure steam above 12-20 bar**	**Vapeur haute-pression sup. 12-20 bars**
19.22	Kugelhahn	DN15	9 +10	454 191	Z	2,440	Ball cock	Robinet à bille
19.23	Schmutzfänger	DN15	9 +10	499 087	Z	2,350	Dirt trap	Tamis
19.24	Druckregler	DN15	9 +10	640 019	Z	14,380	Steam pressure regulator	Rég. vapeur
19.25	Kondensatkontrollgerät	DN15	9 +10	699 022	Z	6,200	Condensate checking device	Contrôleur de condensat
19.26	Kondensatableiter	DN15	9 +10	499 039	Z	3,900	Condensate trap	Organe d'évacuation
	Hochdruckdampf 20-25 bar						**High pressure steam 20-25 bar**	**Vapeur haute-pression 20-25 bar**
19.27	Kugelhahn DN 15		9+10	454 191	Z	2,440	Ball cock	Robinet à bille
19.28	Schmutzfänger DN 15		9+10	499 087	Z	2,350	Dirt trap	Tamis
19.29	Druckregler DN 15		9+10	640 016	Z	8,220	Steam pressure regulator	Régulateur vapeur
19.30	Kondensatkontrollgerät DN 15		9+10	699 022	Z	6,200	Condensate checking device	Contrôleur de condensat
19.31	Kondensatableiter DN 15		9+10	499 039	Z	3,900	Condensate trap	Organe d'évacuation

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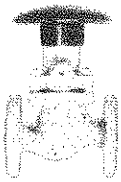

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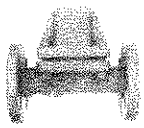

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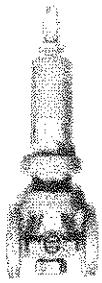

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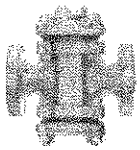

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Bild Pict. Photo	**Bezeichnung** Brenner-Typenreihe Burner serie Type brûleur	**MV** Größe Size Grand.	Bestell-Nr. Order-No. No de commande		ca. kg appr. kg env. kg	**Designation**	**Désignation**
19.40	**Armaturen für Medium-Vorwärmer ohne nachgeschaltetem Elektro-Vorwärmer**					**Valve train for medium preheaters without added electric preheater**	**Tuyauterie et raccord pour réchauffeur à fluide sans réchauffeur électrique en série**
	Heißwasser bis 200°C					**Hot water up to 200°C**	**Eau surchauffée 200°C max.**
19.41	Kugelhahn DN 15	9+10	454 191	Z	2,440	Ball cock	Robinet à bille
19.42	Schmutzfänger DN 15	9+10	499 087	Z	2,350	Dirt trap	Tamis
19.43	Regelventil 15/6 H1F	9+10	605 105	Z	3,200	Regulating valve	Soupape
19.44	Thermostat 4.05	9+10	690 002	Z	3,000	Thermostat	Régulateur
	Wärmeträgeröl bis 250°C					**Heat carrier oil up to 250°C**	**Thermofluide 250°C max.**
19.45	Kugelhahn DN 15	9+10	454 191	Z	2,440	Ball cock	Robinet à bille
19.46	Schmutzfänger DN 15	9+10	499 087	Z	2,350	Dirt trap	Tamis
19.47	Regelventil 15 H1 F	9+10	605 102	Z	3,100	Regulating valve	Soupape
19.48	Thermostat 4.05	9+10	690 002	Z	3,000	Thermostat	Régulateur
19.49	Kühlstück KS5	9+10	605 111	Z	0,600	Intermediate piece	Pièce intermediaire
	Wärmeträgeröl 250-300°C					**Heat carrier oil 250-300°C**	**Thermofluide 250-300°C**
19.50	Faltenbalgventil DN 15	9+10	454 138	Z	3,800	Sipon valve	Vanne à soufflet
19.51	Schmutzfänger DN 15	9+10	499 087	Z	2,350	Dirt trap	Tamis
19.52	Regelventil 15/6 H1 F	9+10	605 105	Z	3,200	Regulating valve	Soupape
19.53	Thermostat 4.05	9+10	690 002	Z	3,000	Thermostat	Régulateur
19.54	Kühlstück KS5	9+10	605 111	Z	0,600	Intermediate piece	Pièce intermediaire
	Hochdruckdampf bis 13 bar					**High pressure steam upto 13 bar**	**Vapeur haute-pression 13 bar max.**
19.55	Kugelhahn DN 15	9+10	454 191	Z	2,440	Ball cock	Robinet à bille
19.56	Schmutzfänger DN 15	9+10	499 087	Z	2,350	Dirt trap	Tamis
19.57	Regelventil 15/6 M1 F	9+10	605 106	Z	3,400	Regulatingvalve	Soupape
19.58	Thermostat 4.05	9+10	690 002	Z	3,000	Thermostat	Régulateur
19.59	Kondensatkontrollgerät DN 15	9+10	699 022	Z	6,200	Condensate checking device	Contrôleur de condensat
19.60	Kondensatableiter DN 15	9+10	499 039	Z	3,900	Condensatetrap	Organe d'évacuation
	Hochdruckdampf 13-20 bar					**High pressure steam 13-20 bar**	**Vapeur haute-pression 13-20 bar**
19.61	Kugelhahn DN 15	9+10	454 191	Z	2,440	Ball cock	Robinet à bille
19.62	Schmutzfänger DN 15	9+10	499 087	Z	2,350	Dirttrap	Tamis
19.63	Regelventil 15/6 H1 F	9+10	605 105	Z	3,200	Regulating valve	Soupape
19.64	Thermostat 4.05	9+10	690 002	Z	3,000	Thermostat	Régulateur
19.65	Kondensatkontrollgerät DN 15	9+10	699 022	Z	6,200	Condensate checking device	Contrôleur de condensat
19.66	Kondensatableiter DN 15	9+10	499 039	Z	3,900	Condensate trap	Organe d'évacutation
19.67	Kühlstück KS4	9+10	605 112	Z	0,500	Intermediate piece	Pièce intermediaire
	Hochdruckdampf 20-25 bar					**High pressure steam 20-25 bar**	**Vapeur haute-pression 20-25 bar**
19.68	Kugelhahn DN 15	9+10	454 191	Z	2,440	Ball cock	Robinet à bille
19.69	Schmutzfänger DN 15	9+10	499 087	Z	2,350	Dirt trap	Tamis
19.70	Druckregler DN 15	9+10	640 016	Z	8,220	Steam pressure regulator	Régulateur vapeur
19.71	Regelventil 15/6 H1 F	9+10	605 105	Z	3,200	Regulating valve	Soupape
19.72	Thermostat 4.05	9+10	690 002	Z	3,000	Thermostat	Régulateur
19.73	Kondensatkontrollgerät DN 15	9+10	699 022	Z	6,200	Condensate checking device	Contrôleur de condensat
19.74	Kondensatableiter DN 15	9+10	499 039	Z	3,900	Condensate trap	Organe d'évacuation
19.75	Kühlstück KS4	9+10	605 112	Z	0,500	Intermediate piece	Pièce intermediaire
19.76	Kopfstück	9+10	690 004	Z	0,365	Head piece	Tête de thermostat