

DOCUMENTS LIST		Rev.0			
			JOB2 F11-Item64H1 ord.n. del 12/03/2012		
Doc.Ident.	N.Doc.	Rev.	Documents Description	III PHASE	
2	2F11-40-003_Rev.1		1 DBI data-sheets filled up by supplier	OK	
3	2013_01_07_CAR_TEC_IBR6GL_rev0		0 Supplier's data sheets	OK	
7	2013_01_07_DOCUMENT_LIST_rev0		0 Document list	OK	
8	ENGL_2013_03_26_QCP_IBR6GL_FS21201210_rev0		0 Supplier Quality Control plan	OK	
9	0002901650_REV2		2 Supplier P&ID of the burner	OK	
10	FS21201210		1 General arrangement of burner on hot air generator	OK	
11	FS21201211		0 General arrangement of gas train	OK	
12	FS21201213		0 Main electrical panel		
13	0002631080		0 Electrical documentation	OK	
15			Any other relevant documentation for the equipment by DBI	NA	
16	0002993588rev0		0 Item drawings complete with pieces list and identification codes for the proposes spare parts	OK	
			Regulation EC No.428/2009 of 5 may 2009 which make a control system of the export and technologies at		
16	dual_use_bellico_3_engl_rev0		0 DUAL USE	OK	
18			Lubricants list	NA	
19	ENGL_2013_03_26_QCP_IBR6GL_FS21201210_rev0		0 Functional tests and checks reports as per supplier's QCP	OK	
20	0006160000	Ed.2013/01	Instruction manual for transport, storage, use and normal maintenance of each equipment purchased by DBI. Manuals will be supplied also for supplier's subcontractors' equipment (i.e. motors,instruments, etc.)	OK	
21	Included in the manual		0 CE Marking Certificates and EC Conformity Declarations	OK	

JOB2 F11-Item64H1 ord.n.121489 del 15/06/2012

SUPPLIER DATA SHEET

Rev.0

TECHNICAL DATA		MODEL
FS21201210		IBR 6GL
THERMIC CAPACITY	MIN. Kg/h	270
	MAX. Kg/h	800
	MIN. Nm ³ /h	175
	MAX. Nm ³ /h	877
FLOW RATE	MIN. kW	1744
	MAX. kW	8721
LIGHT OIL VISCOSITY		1,5°E a/at 20°C
FAN MOTOR	kW	NOT INCLUDED

IGNITION TRANSFORMER	VOLT	8 kV-20 Ma - 230V/50Hz
VOLTAGE POWER	TRIPHASE	415V-50 Hz
AUXILIARY POWER	MONOPHASE	220V-50 Hz
STANDARD ACCESSORIES		
INSULATING GASKET		N° 1
STUD BOLTS		N° 8 - M 14 L.100
EXAGONAL NUTS -		N° 16 - M 14
FLAT WASHERS		N° 16 - Ø 14
FS21201211		FS. RAMPA IBR6 DN80 DESMET2F11

FS21201212		FS. CENTR. CSG800A DESMET 2F11
		2,2 kW
PUMP MOTOR	kW	1450 r.p.m.

FS21201213		FS. QUADRO ELET. IBR6GL 2F11
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QUALITY CONTROL PLAN



Test Date: 09/10/2012

Test Operator :

Vancini P:

Final result :

JOB2 F11-Item64H1

ord.n.121489 del

15/06/2012

FS21201210 IBR 6GL A COM Serial Nr.: 9204442

Undersigned by : Tech. Dept Sisti

Approved : Tech. Dept
Melloni S

Rev. : 0

Pos.	OPERATION	CHECK MODALITY	CHECK MODALITY	RESULT
1	PE continuity check, insulation and dielectric strength (rigidity) check, (APE Test)	APE Device	$I \leq 3,5\text{mA}$, $R \geq 2\text{M}\Omega$, $V = 1000\text{V}$, $R \leq 0,1\text{Ohm}$	ok
2	Switch the power ON	Manually		ok
3	Simulation of air pressure switch proper functioning	Manually/Visually	Verify burner's lock out	ok
4	Unlock the burner by pressing button placed inside "bookstand" electrical panel	Manually/Visually		ok
5	Burner must start	Visually		ok
6	Check the proper functioning of flame detector: screen the sensor from light and verify burner's lock out. Reposition the sensor onto the simulator	Manually/Visually		ok
7	Check if any oil leak occur at nozzles' group	Visually		ok
8	Check electrical discharge at High Voltage electrodes	Visually		ok
9	Activate modulation button on simulator at minimum and verify the air damper is closed	Manually/Visually		ok
10	Activate modulation button on simulator at the maximum and verify the air damper is being opening	Manually/Visually		ok
11	Adjust pump's pressure at 22 bar	Manually/Visually	22 bar	ok
12	Adjust pump's pressure at 8 bar	Manually/Visually	8 bar	ok
13	Adjust pump's pressure at 18 bar	Manually/Visually	18 bar	ok

SPECIFICA DI COLLAUDO GI 350DSPN-D DESMET BALLESTRA



Test Date: 09/10/2012

Test Operator :

Vancini P:

Final result :

JOB2 F11-Item64H1

ord.n.121489 del

15/06/2012

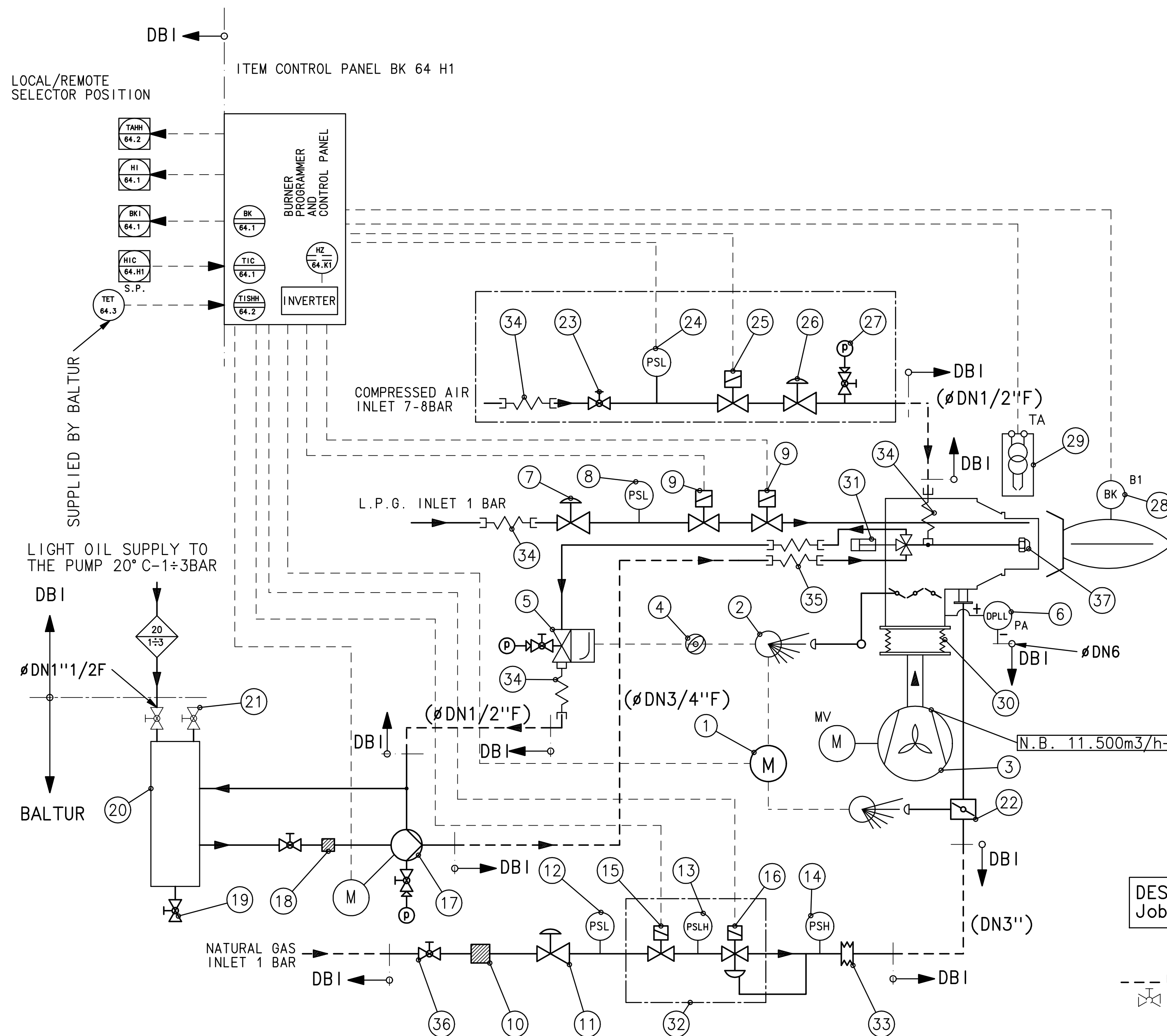
FS21201210 IBR 6GL A COM Serial Nr.: 9204442

Undersigned by : Tech. Dept Sisti

Approved : Tech. Dept
Melloni S

Rev. : 0


Pos.	OPERATION	CHECK MODALITY	CHECK MODALITY	RESULT
14	Visual check of the burner	it must be free from painting failing and all components must be correctly assembled		OK
15	Check equipments completeness	Visually, all components described in itemized list must be present		OK
16	Verify emergency stop red button's ("mushroom") proper functioning	Visual		OK
17	Verify pump's termic relay's intervention	Visual		OK
18	Verify valves' leak	Visual		OK
19	Verify very high temperature lock out	Visual		OK
20	Verify air pressure switch intervention	Visual		OK
21	Verify compressed air pressure switch intervention	Visual	4 bar	OK
22	Verify "feed-back auto-man"	Visual		OK
23	Verify local-remote	Visual		OK
24	Verify cumulative locks up	Visual		OK
25	Verify very high temperature lock out	Visual		OK

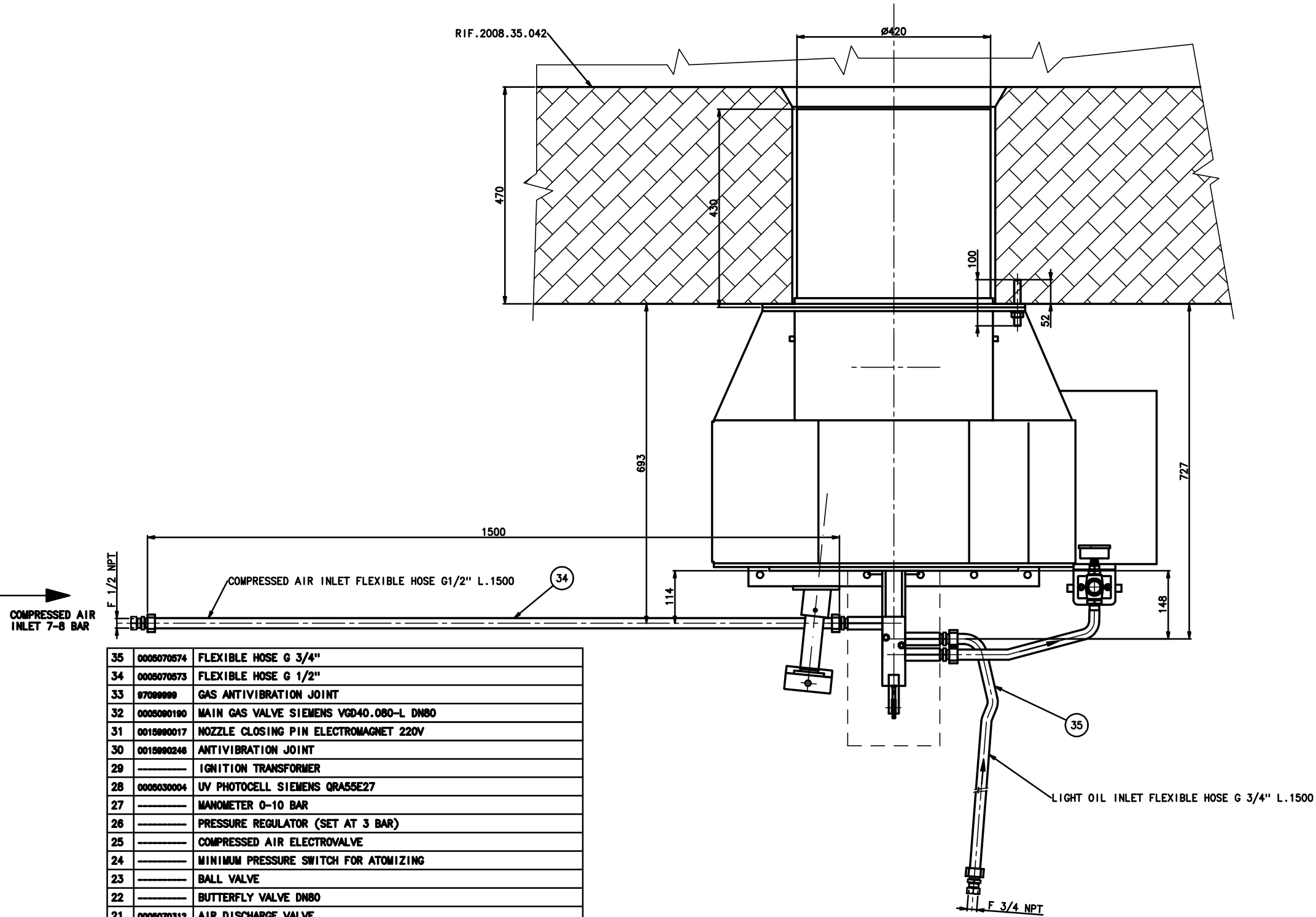


- 1 - MODULATION SERVOMOTOR CONTROLLI MDL24
- 2 - DISK WITH AIR REGULATION SCREW
- 3 - FAN (NOT SUPPLIED)
- 4 - OIL RETURN PRESSURE REGULATION ECCENTRIC
- 5 - RETURN PRESSURE REGULATOR (MIN SET AT 8BAR-MAX SET AT 18BAR)
- 6 - DIFFERENTIAL AIR PRESSURE SWITCH
- 7 - GAS PRESSURE REGULATOR WITH BUILT-IN FILTER BTFR/10 1/2" BL
- 8 - MIN GAS PRESSURE SWITCH (PILOT) GW500A4/2
- 9 - PILOT GAS VALVE BRAHMA E6G.SR8 1/2"CFD
- 10 - GAS FILTER GIULIANI ANELLO RIF. 70620F/6B
- 11 - DN80 GAS PRESSURE REDUCER BTR/10 FROM 1 BAR TO 300 MBAR
- 12 - MINIMUM GAS PRESSURE SWITCH DUNGS GW500A4/2
- 13 - TIGHTNESS CONTROL GAS PRESSURE SWITCH GW500A4/2
- 14 - MAXIMUM GAS PRESSURE SWITCH GW500A4/2
- 15 - SAFETY GAS VALVE SKP15.000E2
- 16 - MAIN GAS VALVE WITH PRESSURE REGULATOR SIEMENS SKP25.003E2
- 17 - PUMP HP 2000 VBHRG.D.4.1.0 (SET AT 22BAR) WITH MOTOR
- 18 - FILTER 1"1/2 GAS RIF.41000/03 300 MICRON
- 19 - WATER AND PLANT DISCHARGING FXF 3/4"
- 20 - RECOVERY AND DEGASSING TANK
- 21 - AIR DISCHARGE VALVE
- 22 - BUTTERFLY VALVE DN80
- 23 - BALL VALVE
- 24 - MINIMUM PRESSURE SWITCH FOR ATOMIZING (SET AT 4BAR)
- 25 - COMPRESSED AIR ELECTROVALVE
- 26 - PRESSURE REGULATOR (SET AT 3 BAR)
- 27 - MANOMETER 0-10 BAR
- 28 - UV PHOTOCCELL SIEMENS QRA55E27
- 29 - IGNITION TRANSFORMER
- 30 - ANTIVIBRATION JOINT
- 31 - NOZZLE CLOSING PIN ELECTROMAGNET 220V
- 32 - MAIN GAS VALVE SIEMENS VGD40.080-L DN80
- 33 - GAS ANTIVIBRATION JOINT DN80
- 34 - FLEXIBLE HOSE G 1/2"
- 35 - FLEXIBLE HOSE G 3/4"
- 36 - GAS BALL VALVE
- 37 - NOZZLE 800KG/H

DESMET BALLESTRA SpA-Ord.n.121489 del 15/06/2012
Job 2 F11 - Item 64H1

--- PIPING WORK TO BE CARRIED OUT BY INSTALLATION TECHNICIAN
BALL VALVES

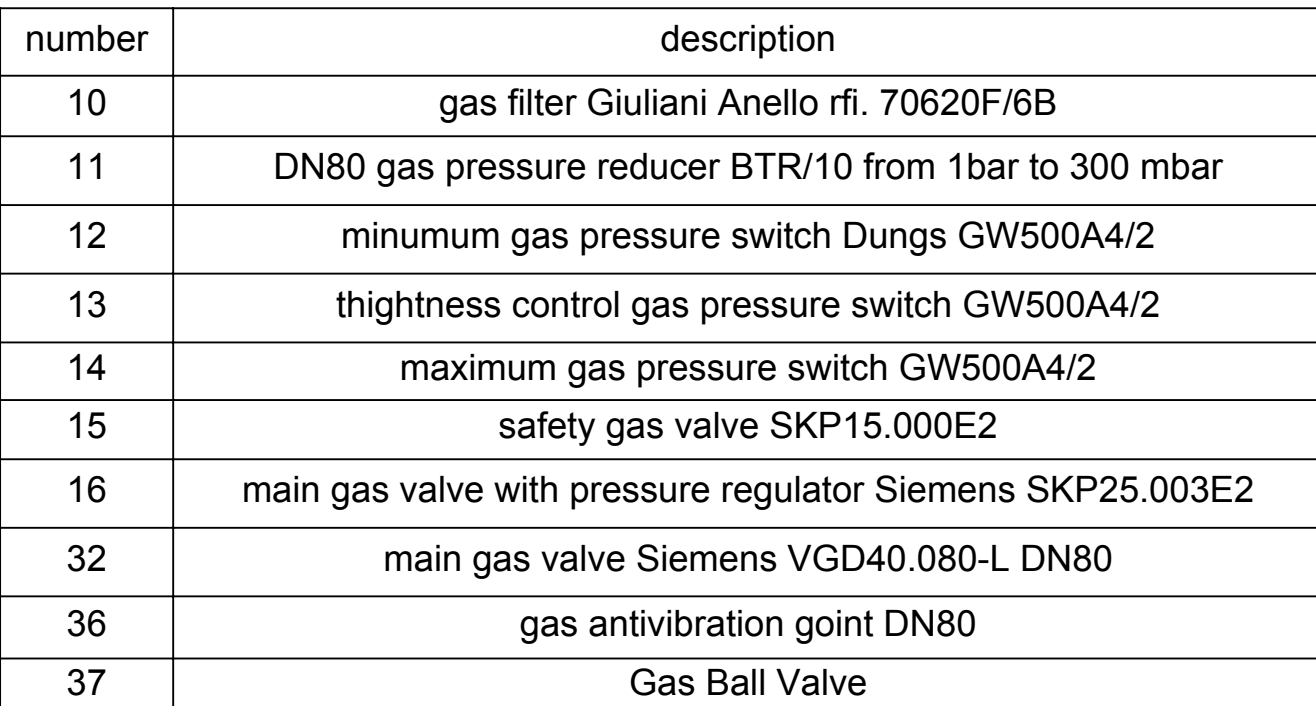
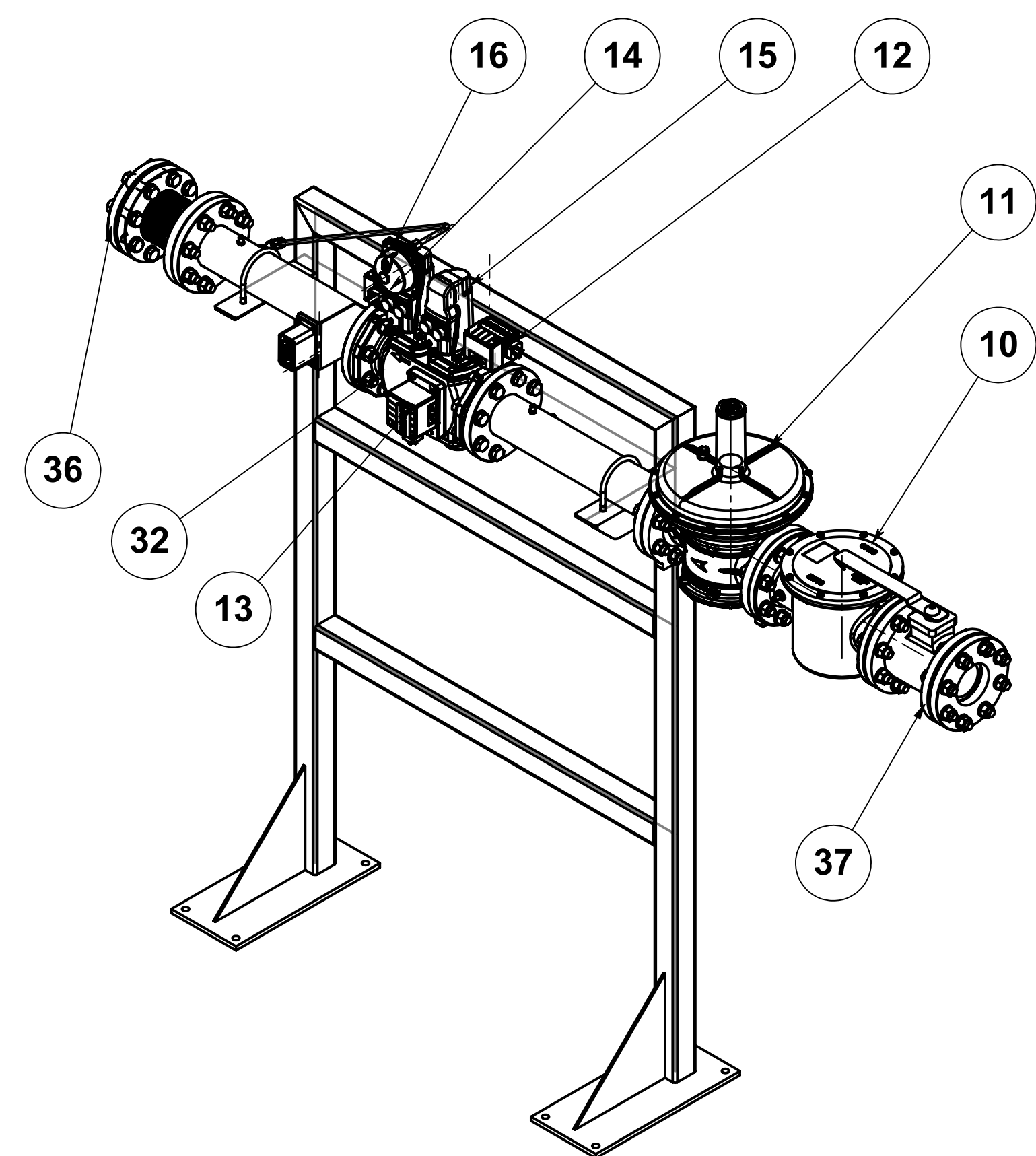
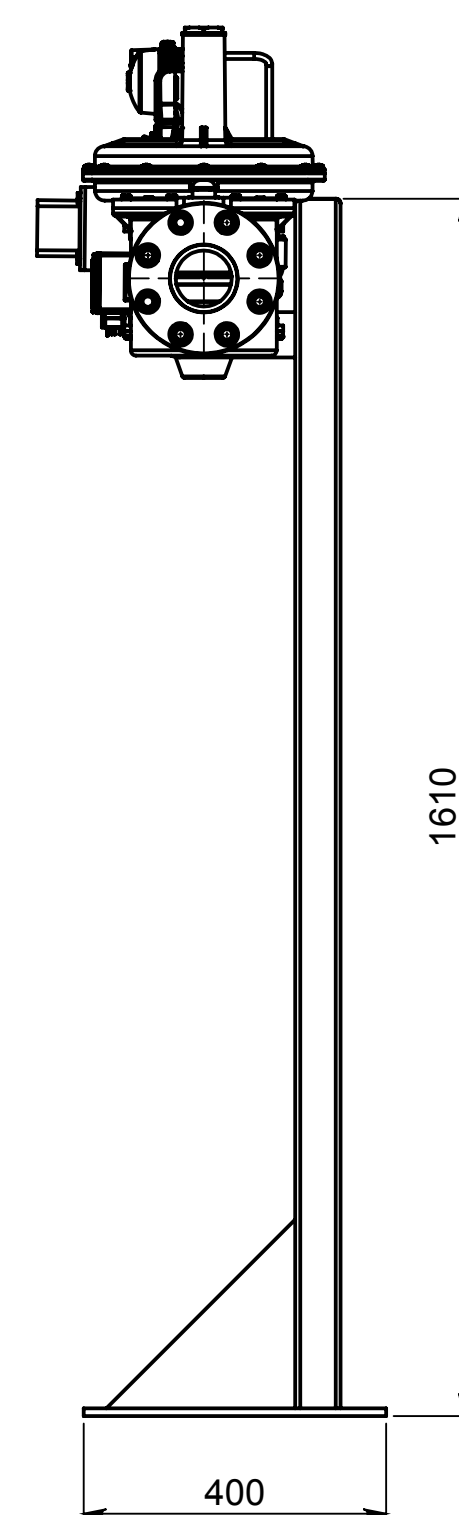
2	AGGIORNATO COME RICHIESTO DAL CLIENTE										R.M.N.		25/10/12		V.Sisti				
Rev.	Descrizione modifica										R.M.N.		Data		Firma				
TOLLERANZE GENERALI PARTI LAVORATE SENZA TOLLERANZA UNI EN 22768/1 (MEDIA)		DIMENS.		0,5-3	3-6	6-30	30-120	120-400	400-1000	1000-2000	ANGOLI	0-10	10-50	50-120	SMISSE E RACCORDI	0,5-3	3-6		
		TOLLER.		± 0,1	± 0,1	± 0,2	± 0,3	± 0,5	± 0,8	± 1,2	TOLLER.	± 1°	± 0°30'	± 0°20'	TOLLER.	± 0,2	± 0,5		
Disegnato		Controllato		Materiale															
Data		11/05/12		25/10/2012		Trattamenti termici sul pezzo													
Firma		V.Sisti		V.Sisti															
Riv. protettivo																			
baltur CENTO (Fe)		Codice/Documento										PARTI PRESSOFUSE IN LEGA DI ALLUMINIO GRADO DI PRECISIONE 1 SECONDO UNI 10569				PARTI STAMPATE IN LAMIERA SPESSORE ±5% ANGOLI ±1° LUNGHEZZE, DIAMETRI ± 0,5%		 Scala: 1:1	
		0002901650										PARTI FUSE IN TERRA UNI 1508002							
		Particolare		FS. IBR 60L ACOM DESMET 2F11															




35	0005070574	FLEXIBLE HOSE G 3/4"
34	0005070573	FLEXIBLE HOSE G 1/2"
33	97098989	GAS ANTIVIBRATION JOINT
32	0005090190	MAIN GAS VALVE SIEMENS VGD40.080-L DN80
31	0019890017	NOZZLE CLOSING PIN ELECTROMAGNET 220V
30	0019890246	ANTIVIBRATION JOINT
29	_____	IGNITION TRANSFORMER
28	0005030004	UV PHOTOCELL SIEMENS GRA55E27
27	_____	MANOMETER 0-10 BAR
26	_____	PRESSURE REGULATOR (SET AT 3 BAR)
25	_____	COMPRESSED AIR ELECTROVALVE
24	_____	MINIMUM PRESSURE SWITCH FOR ATOMIZING
23	_____	BALL VALVE
22	_____	BUTTERFLY VALVE DN80
21	0005070312	AIR DISCHARGE VALVE
20	0014030314	RECOVERY AND DEGASSING TANK
19	0005070312	WATER AND PLANT DISCHARGING FKF 3/4"
18	23777	FILTER 1"1/2 GAS RIF.41000/03 300 MICRON
17	0005090072	PUMP HP 2000 VBRG.D.4.1.0 (SET AT 22BAR) WITH MOTOR
16	0005090232	MAIN GAS VALVE WITH PRESSURE REGULATOR SIEMENS SKP25.003E2
15	0005090031	SAFETY GAS VALVE SKP15.000E2
14	0005040035	MAXIMUM GAS PRESSURE SWITCH QW500A4/2
13	0005040036	TIGHTNESS CONTROL GAS PRESSURE SWITCH QW500A4/2
12	0005040035	MINIMUM GAS PRESSURE SWITCH DUNGS QW500A4/2
11	97300827	DN80 GAS PRESSURE REDUCER BTR/10 FROM 1 BAR TO 300 MBAR
10	23465	DN80 GAS FILTER GIULIANI ANELLO RIF. 70620F/6B
9	0005090105	PILOT GAS VALVE BRAHMA EGG.SR8 1/2"CFD
8	0005040035	MINIMUM GAS PRESSURE SWITCH (PILOT) QW500A4/2
7	97300818	GAS PRESSURE REGULATOR WITH BUILT-IN FILTER BTRF/10 1/2" BL
6	0005040134	DIFFERENTIAL AIR PRESSURE SWITCH
5	0019890004	RETURN PRESSURE REGULATOR (MIN SET AT 8BAR-MAX SET AT 18BAR)
4	0019890030	OIL RETURN PRESSURE REGULATOR ECCENTRIC
3	_____	DISK WITH AIR REGULATION SCREW
2	_____	MODULATION SERVO MOTOR CONTROLLI 1 MDL24
POS	NAME	LEGEND

DESMET BALLESTRA SpA-Ord.n.121489 del 15/06/2012
Job 2 F11 - Item 64H1
STANDARD SUPPLY INCLUDES:
- 10 MT BURNER/CONTROL PANEL CONNECTING CABLE
- 10 MT PUSING UNIT PREASSEMBLED CABLE
- 10 MT PUSING UNIT PREASSEMBLED CABLE
- GASKET 1070X100 570-13.8MM INCLUDED IN THE SUPPLY
- N.8 STUD BOLTS M14 L.100H.N.8 FLAT WASHERS+N.8 HEXAGONAL NUTS M14
- N.16 SCREWS HEXAGONAL HEAD+N.16 FLAT WASHERS+N.16 HEXAGONAL NUTS M
- WEIGHT 420 KG

[illegible]

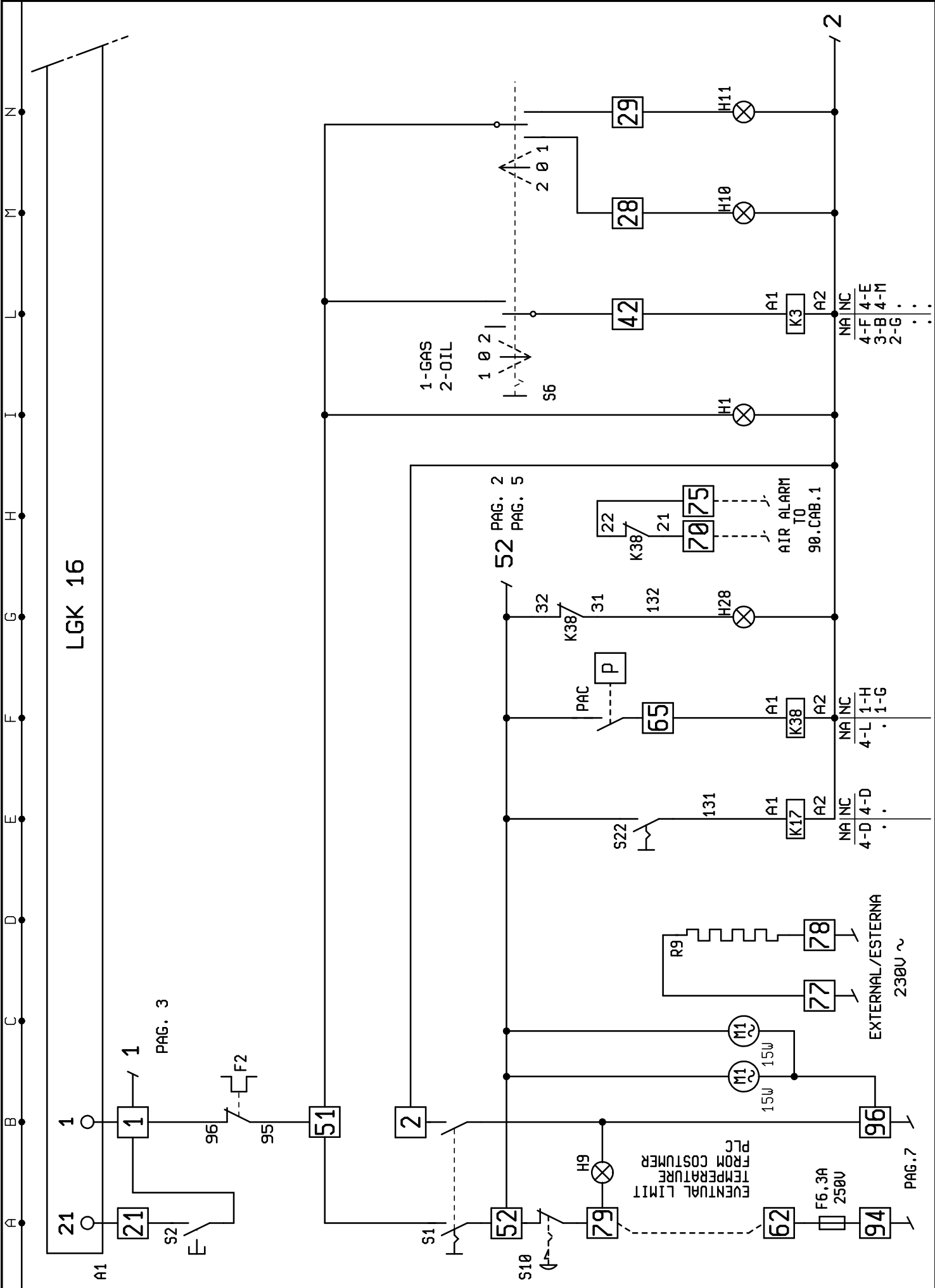


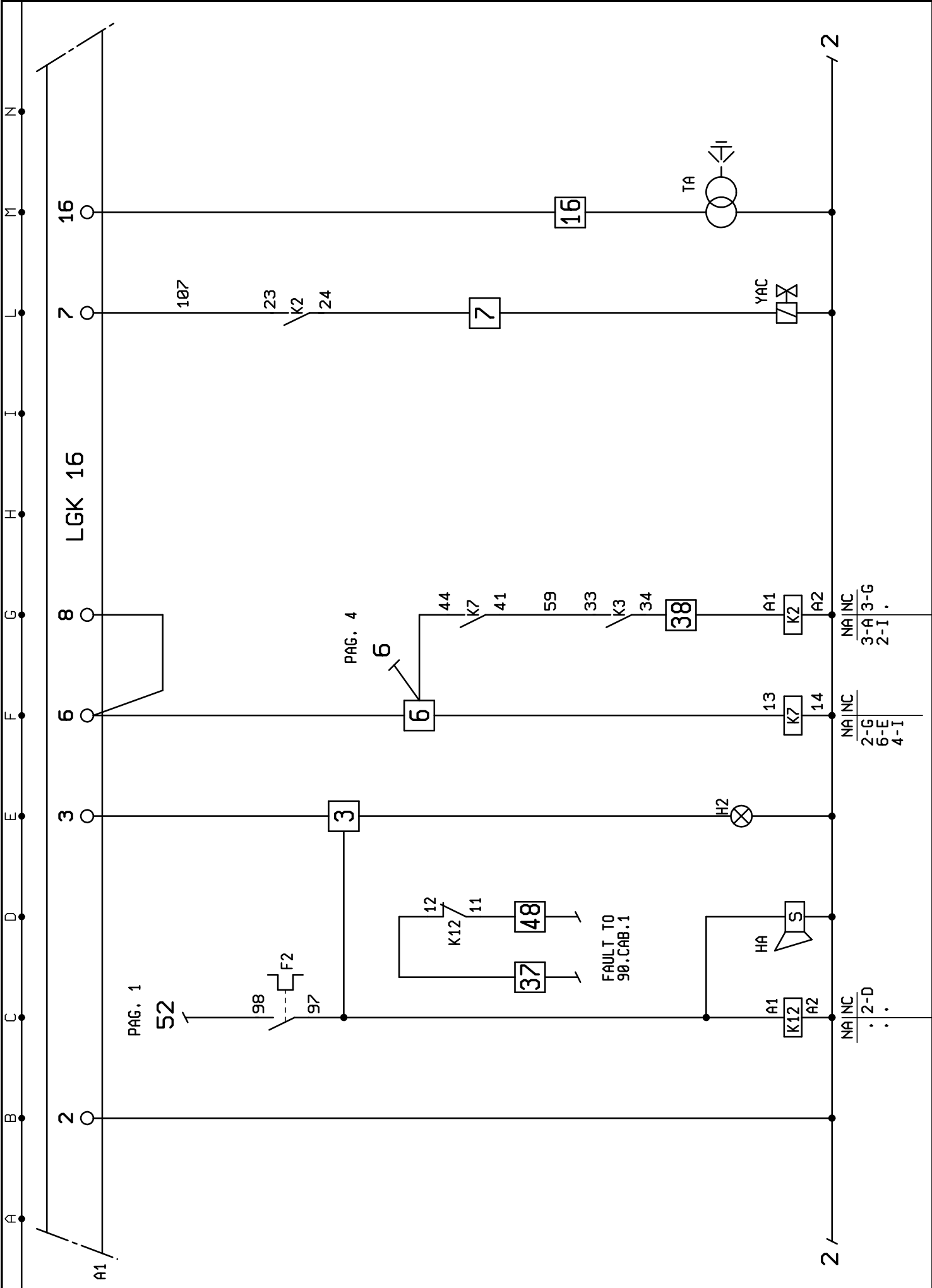
NOTE: NUMBERS REFER TO 0002901650

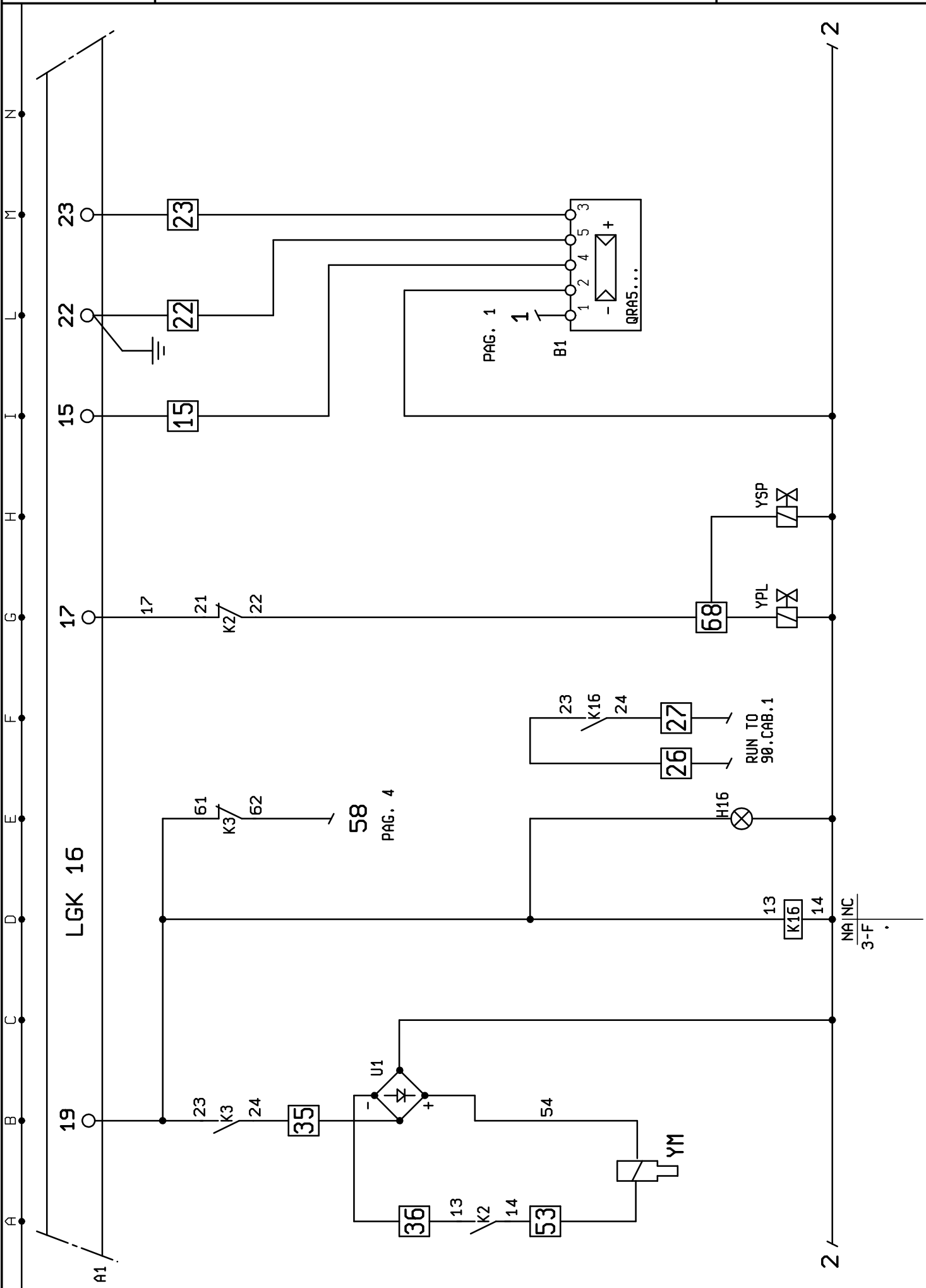
PRIMA EMISSIONE										05/10/2012		V. Sisti			
Rev.	Descrizione modifica										R.M.N°	Data	Firma		
TOLLERANZE GENERALI PARTI TOLLERANZA IN UNO DEI DUE SENSI															
	DIMENS.	0-3	3-6	6-30	30-120	120-400	400-1000	1000-2000	ANGOLI	0-10	10-50	50-90	SWITCH	0-5	5-3
	TOLLER.	± 0.1	± 0.1	± 0.2	± 0.3	± 0.5	± 0.8	± 1.2	TOLLER.	± 1°	± 0°30'	± 0°20'	TOLLER.	± 0.2	± 0.5
	Designato	Controllato		Materiale Materiale «non specificato»						Peso 105,27 Kg					
Data	27/07/2012		05/10/2012		Trattamenti termici sul pezzo										
Firma	F. Gallorini		V. Sisti												
Riv. protettivo															
<div><div><div><div></div><div>CENTRO (fe)</div></div><div><div>Codice/Documento</div><div>FS2102211</div></div><div><div>Particolare</div><div>FS. RAMPA IBR6 DN80 DESMETZF1</div></div></div><div><div><div>PARTI PRESSOFUSI IN LEGA DI ALLUMINIO GRADO DI PRECISIONE SECONDO UNI 10669</div><div>PARTI FUSE IN TERRA UNI D18062</div></div><div><div>PARTI STAMPATE IN LAMIERA</div><div>SPESSORE 5/12</div><div>ANGOLI > 90°</div><div>LUNGHEZZE D'ASSEMMETRI 50/50</div></div></div><div><div>Scala:</div><div>1:10</div></div><div><div>Rev.</div><div>O</div></div></div>															

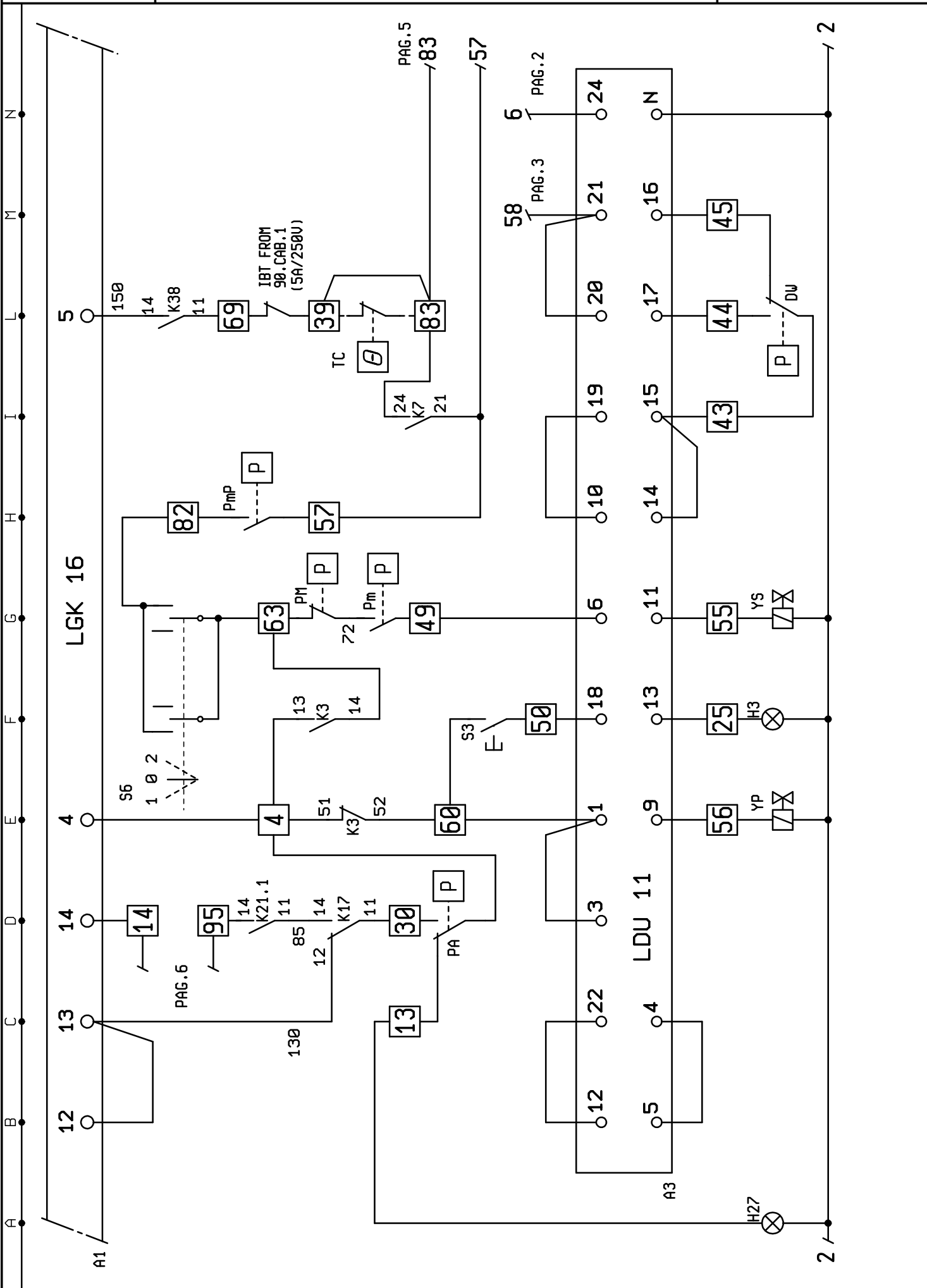
del presente disegno a termini di legge ne e' rigorosamente vietata qualsiasi riproduzione e comunicazione a terzi

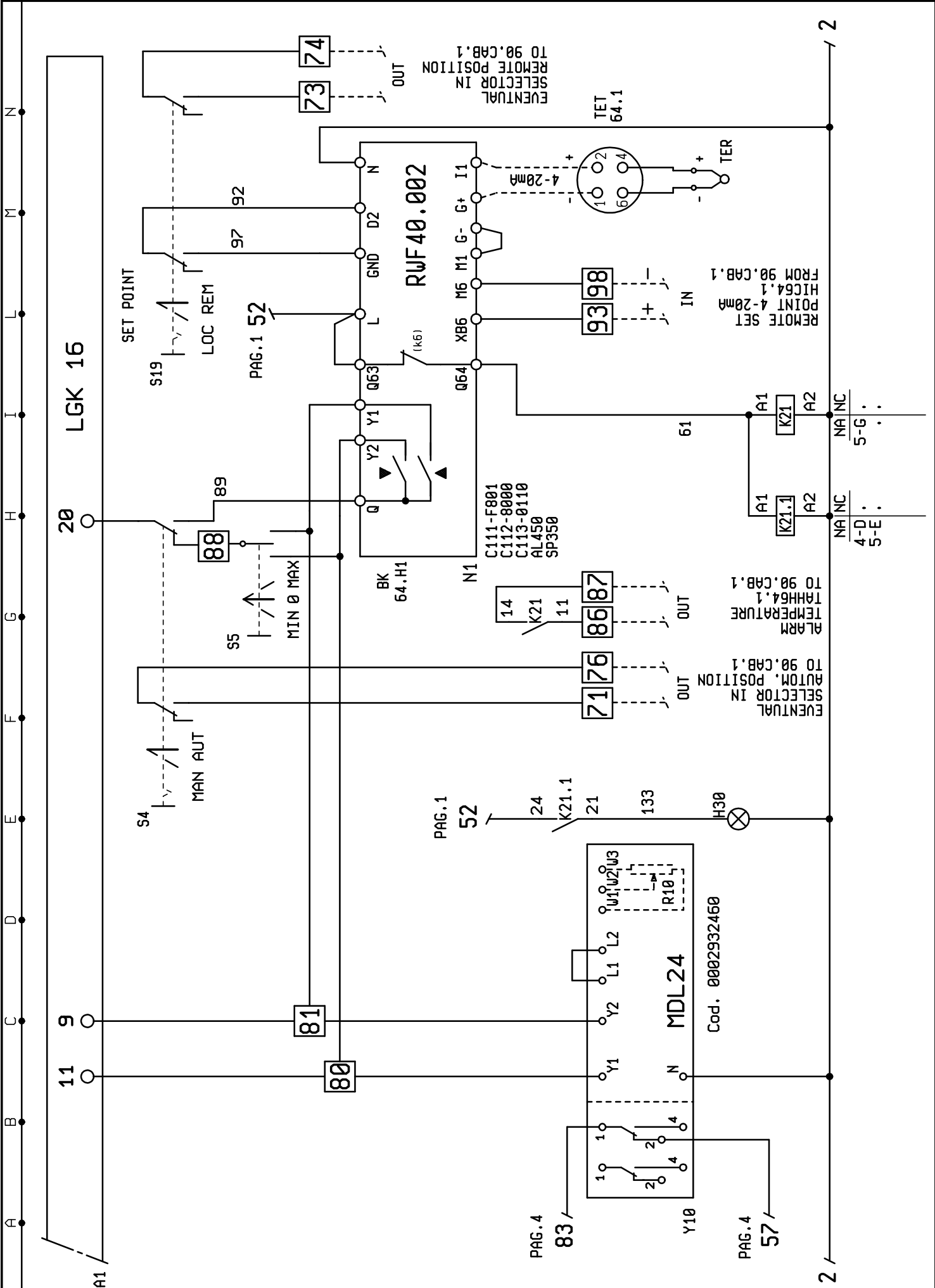
1	2	3	4	5	6	7	8
Customer Desmet Ballestra Spa							
Plant SABIZ 8000 kg/h							
Job 2F11							
Customer ref. FAR EAST MACHINERIES LTD (NIGERIA)							
Item 64.H1							
Burner IBR 6 GL (FS21201213)							
Serial number 9204442							
Electrical Wiring Diagram N 0002631080							
Control Panel : BK64.H1							
Date: 10/10/2012							8
1	2	3			6	7	8

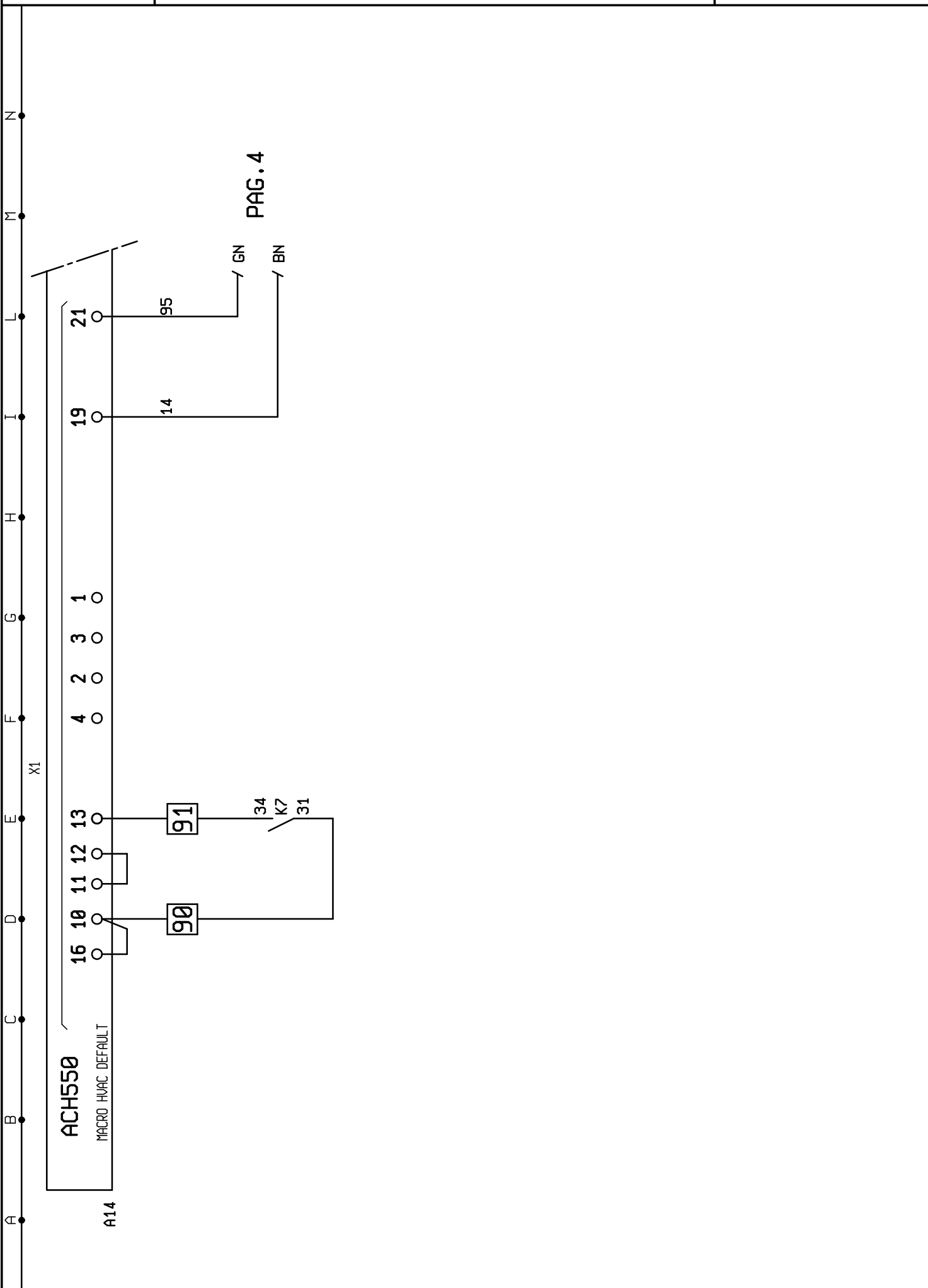


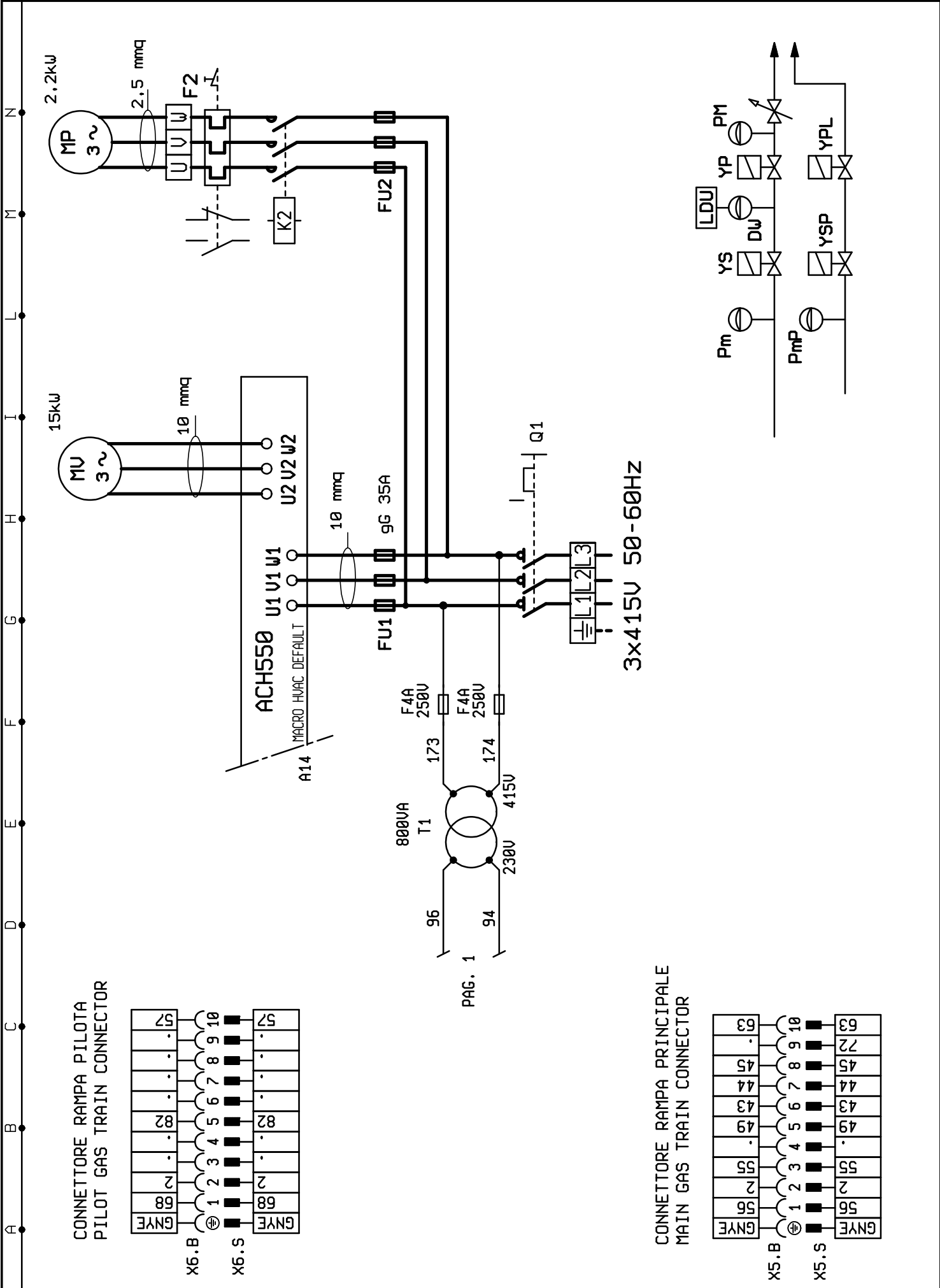


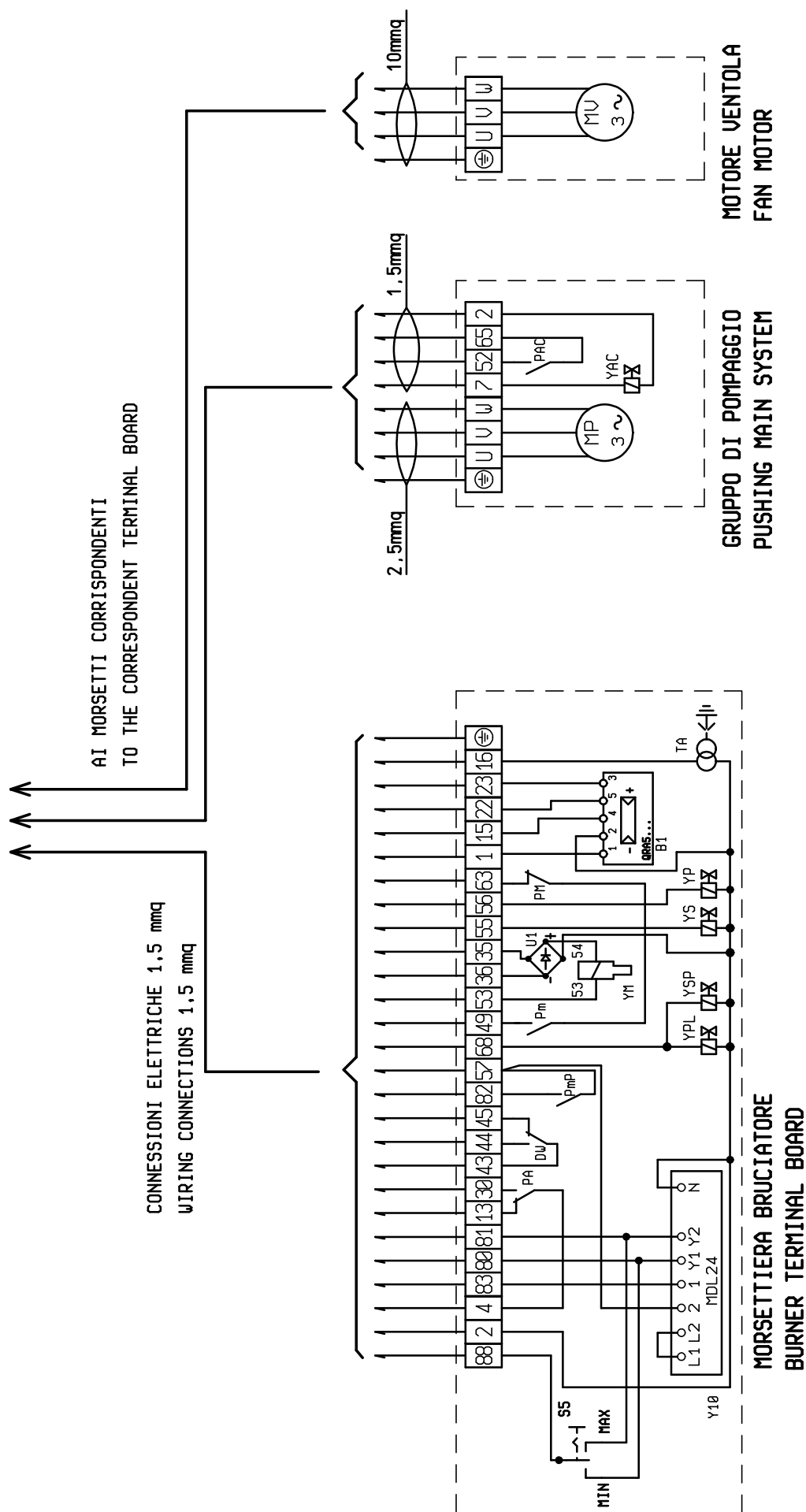


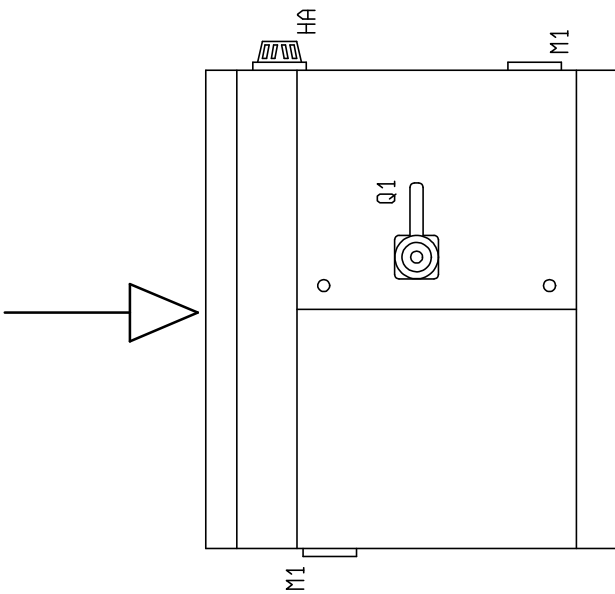
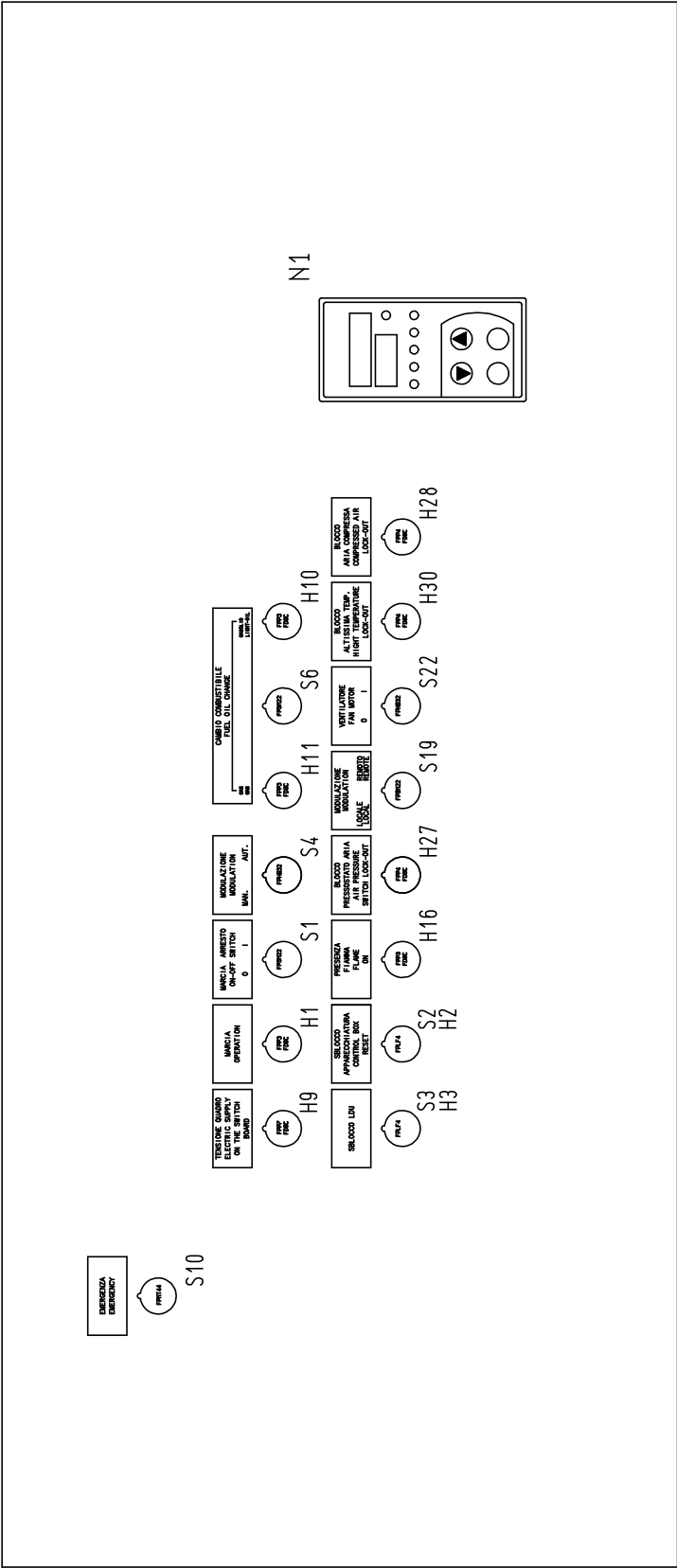


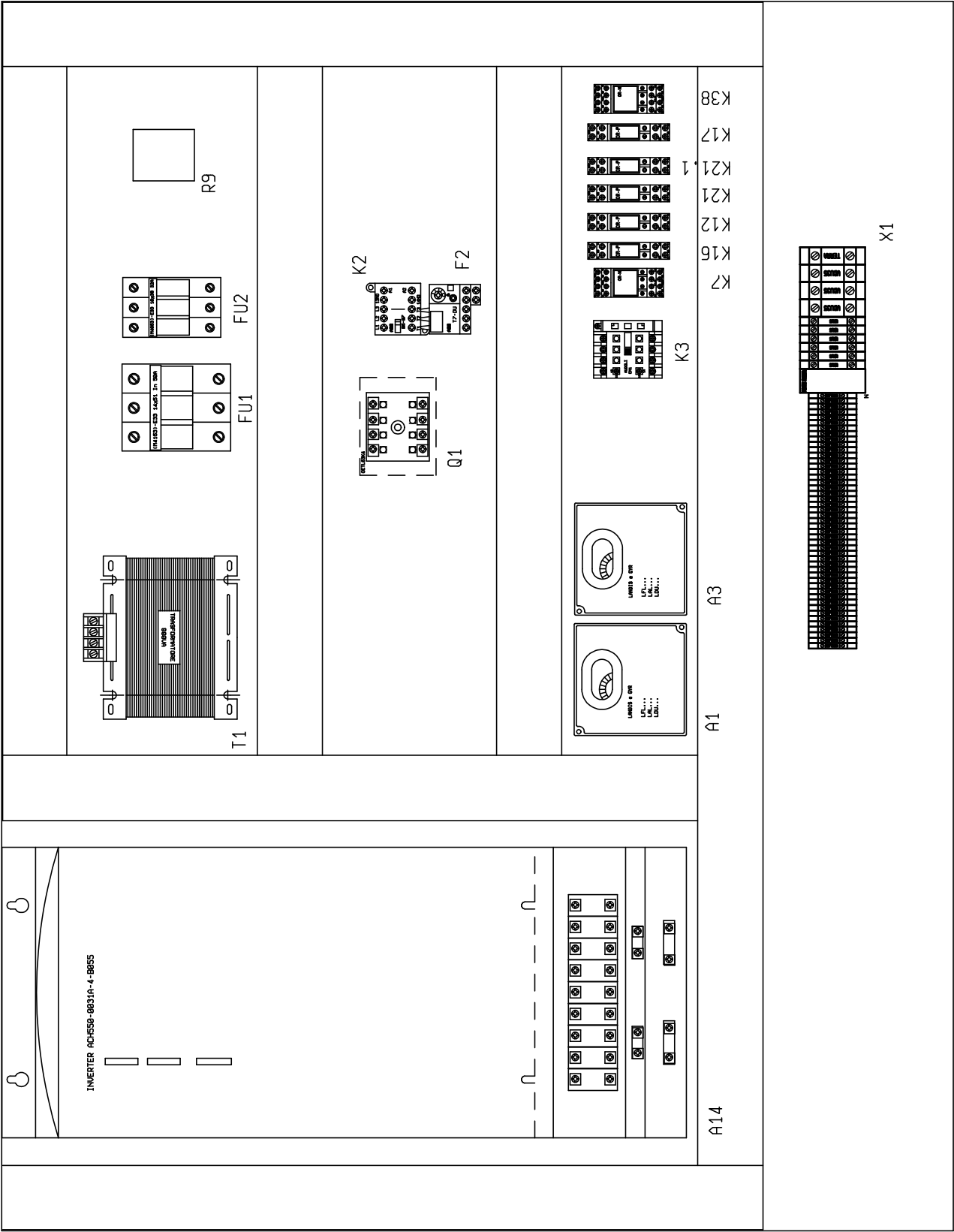














CENTO (FE)

SCHEMA ELETTRICO IBR 6 GL
ELECTRIC WIRING DIAGRAM FOR IBR 6 GL

N°0002631080N11
foglio N. 11 di 11
data 13/07/12
Dis. S.Melloni
Visto S.Melloni

A	B	C	D	E	F	G	H	I	L	M	N
A1											
A3											
A14											
B1											
DW											
F2											
FU1/2											
HA											
H1											
H2											
H3											
H9											
H10											
H11											
H16											
H27											
H28											
H30											
K2											
K3											
K7											
K12											
K16											
K17											
K21-21.1											
K38											
M1											
MV											
MP											
N1											
-APPARECCHIATURA DI CONTROLLO / CONTROL BOX						PA	-PRESSOSTATO ARIA / AIR PRESSURE SWITCH				
-APPARECCHIATURA CONTROLLO TENUTA VALVOLE / VALVES TIGHTNESS CONTROL BOX						PAC	-PRESSOSTATO ARIA COMPRESSA / COMPRESSED AIR PRESSURE SWITCH				
-INVERTER / INVERTER						Pm	-PRESSOSTATO MIN. / MIN. PRESSURE SWITCH				
-FOTOCELLULA UV / UV PHOTOCCELL						PM	-PRESSOSTATO MAX. / MAX. PRESSURE SWITCH				
-PRESSOSTATO PER CONTROLLO TENUTA VALVOLE / PRESSURE SWITCH FOR VAVES TIGHTNESS CONTROL						PmP	-PRESSOSTATO MIN. PILOTA / PILOT MIN. PRESSURE SWITCH				
-RELE' TERMICO MOTORE MP / MP MOTOR THERMIC RELAY						Q1	-INTERRUTTORE SEZIONATORE GENERALE / MAIN SWITCH				
-FUSIBILI / FUSES						R9	-RESISTENZA ANTICONDENSA / CONDENSATION RESISTANCE				
-SIRENA / SIREN						S1	-INTERRUTTORE MARCIA-ARRESTO / ON-OFF SWITCH				
-SPIA MARCIA / OPERATING LIGHT						S2	-PULSANTE SBLOCCO APP.RA A1 / A1 RESET BUTTON				
-SPIA BLOCCO APPARECCHIATURA / CONTROL BOX LOCK OUT LAMP						S3	-PULSANTE SBLOCCO LDU11 / LDU11 RESET BUTTON				
-SPIA BLOCCO CONTROLLO TENUTA VALVOLE / VALVES TIGHTNESS CONTROL LAMP						S4	-COMMUTATORE AUTOMATICO-MANUALE MODULAZIONE / AUTOMATIC-MANUAL EXCHANGER MODULATION				
-SPIA TENSIONE QUADRO / VOLTAGE SIGNAL LAMP						S5	-COMMUTATORE MASSIMO-MINIMO MODULAZIONE -MAX/MIN EXCHANGER MODULATION				
-SPIA FUNZIONAMENTO OLIO COMBUSTIBILE / HEAVY-OIL LAMP						S6	-SELETORE CAMBIO COMBUSTIBILE / SWITCH FOR CHANGING FUEL				
-SPIA FUNZIONAMENTO A GAS / NATURAL GAS SIGNAL LAMP						S10	-PULSANTE A FUNGO EMERGENZA / EMERGENCY BUTTON				
-SPIA PRESENZA FIAMMA / LAMP FLAME PRESENCE						S19	-INTERRUTTORE LOCALE-REMOTO SET POINT / SET POINT LOCAL-REMOTE SWITCH				
-SPIA BLOCCO PA / PA LOCK-OUT LAMP						S22	-INTERRUTTORE VENTILATORE / FAN SWITCH				
-SPIA BLOCCO ARIA COMPRESSA / COMPRESSED AIR LOCK-OUT LAMP						TA	-TRASFORMATORE D'ACCENSIONE / IGNITION TRANSFORMER				
-SPIA BLOCCO ALTA TEMPERATURA / HIGH TEMP.RE LOCK-OUT LAMP						TER	-TERMOCOPPIA / THERMOCOUPLE				
-CONTATTORE MOTORE POMPA / PUMP MOTOR CONTACTOR						TC	-TERMOSTATO CALDAIA / BOILER THERMOSTAT				
-CONTATTORE AUSILIARIO CAMBIO COMBUSTIBILE / AUXILIARY CONTACTOR FOR CHANGING FUEL						T1	-TRASFORMATORE 415-230V / 415-230V TRASFORMER				
-RELE' AUX. MOTORE / MOTOR AUXILIARY RELAY						U1	-PONTE RADDRIZZATORE / RECTIFIER BRIDGE				
-RELE' AUS. BLOCCO / LOCKOUT AUX. RELAY						YAC	-VALVOLA ARIA COMPRESSA / COMPRESSED AIR VALVE				
-RELE' FIAMMA / FLAME RELAY						Y10	-SERVOMOTORE DI MODULAZIONE / MODULATION SERVOMOTOR				
-RELE' AUX. PA / PA AUX. RELAY						YM	-ELETTROMAGNETE / ELECTROMAGNET				
-RELE' AUSILIARIO TEMP MAX / AUX. RELAY MAX TEMPERATURE						YP	-VALVOLA GAS PRINCIPALE / MAIN GAS VALVE				
-RELE' AUSILIARIO PAC / PAC AUXILIARY RELAY						YPL	-VALVOLA GAS RAMPA PILOTA / PILOT GAS VALVE				
-VENTOLA RAFFREDDAMENTO QUADRO / POWER CABINET COOLING FAN						YS	-VALVOLA GAS DI SICUREZZA / SAFETY GAS VALVE				
-MOTORE VENTOLA / FAN MOTOR						YSP	-VALVOLA GAS SICUREZZA PILOTA / SAFETY PILOT GAS VALVE				
-MOTORE POMPA / PUMP MOTOR						X1.	-MORSETTIERA BRUCIATORE / BURNER TERMINAL				
-REGOLATORE ELETTRONICO DI MODULAZIONE / MODULATION ELETRONIC REGULATOR						X5.B,X5.S	-CONNETTORE MOBILE RAMPAS GAS PRINCIPALE / MAIN GAS TRAIN FLOATING PLUG				
						X6.B,X6.S	-CONNETTORE MOBILE RAMPAS GAS PILOTA / PILOT GAS TRAIN FLOATING PLUG				

STATEMENT

about EC regulations N. 428/2009 and 423/2007

Date: 27/03/2013

Pages: 1

TO: DESMET BALLESTRA

This is to certify that the lot concerning order. No. 121489 of June 15th 2012, Job 2 F11, items 64H1, does **not** include parts which fall within the categories listed in Annexes I and IV of the EC Regulation No. 428/2009 and / or within Annex II of the Regulation EC No. 423/2007 of 19.04.2007 (with subsequent amendments).

baltur

Approvals Manager
Amadio Marco Pilati



Instruction manual.



IBR 6 GL

- Industrial dual gas-diesel modulating type burners,
with flame regulation and separate fan
- JOB 2F11 - ITEM 64H1 order No. 121489
- FS21201210
- FS21201211
- FS21201212
- FS21201213



- Before using the burner for the first time please carefully read the chapter "WARNING NOTES FOR THE USER : HOW TO USE THE BURNER SAFELY" in this instruction manual, which represents an integral and essential part of the product.
- Read the instructions carefully before starting or servicing the burner.
- Any operation on burner or system must be carried out only by qualified personnel.
- Disconnect the electrical power before starting any operation. If the works are not carried out correctly it is possible to cause dangerous accidents.

Declaration of Conformity

We declare that our products

BPM...; BGN...; BT...; BTG...; BTL...; TBML...; Comi-st...; Gl...; Gl...Mist; Minicomist...; PYR...; RiNOx...; Spark...; Sparkgas...; TBG...; TBL...; TBML ...; TS...; IBR...; IB...

(Variant: ... LX, for low NOx emissions)

Description:

forced air burners of liquid, gaseous and mixed fuels for residential and industrial use meet the minimum requirements of the European Directives:

2009/142/CE(D.A.G.)

2004/108/CE.....(C.E.M.)

2006/95/CE.....(D.B.T.)

2006/42/CE(D.M.)

and conform to European Standards:

UNI EN 676:2008 (gas and combination, gas side)

UNI EN 267:2002 (diesel and combination, diesel side)

These products are therefore marked:



0085

18/11/2010

Dr. Riccardo Fava
Managing Director / CEO



IMPORTANT / NOTE



INFORMATION



WARNING / ATTENTION

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WARNING NOTES FOR THE USER HOW TO USE THE BURNER SAFELY

FOREWORD

These warning notes are aimed at ensuring the safe use of the components of heating systems for civil use and the production of hot water. They indicate how to act to avoid the essential safety of the components being compromised by incorrect or erroneous installation and by improper or unreasonable use. The warning notes provided in this guide also seek to make the consumer more aware of safety problems in general, using necessarily technical but easily understood language. The manufacturer is not liable contractually or extra contractually for any damage caused by errors in installation and in use, or where there has been any failure to follow the manufacturer's instructions.

GENERAL WARNING NOTES

- The instruction booklet is an integral and essential part of the product and must be given to the user. Carefully read the warnings in the booklet as they contain important information regarding safe installation, use and maintenance. Keep the booklet to hand for consultation when needed.
- Equipment must be installed in accordance with current regulations, with the manufacturer's instructions and by qualified technicians. By the term 'qualified technicians' is meant persons that are competent in the field of heating components for civil use and for the production of hot water and, in particular, assistance centres authorised by the manufacturer. Incorrect installation may cause damage or injury to persons, animals or things. The manufacturer will not in such cases be liable.
- After removing all the packaging make sure the contents are complete and intact. If in doubt do not use the equipment and return it to the supplier. The packaging materials (wooden crates, nails, staples, plastic bags, expanded polystyrene, etc.) must not be left within reach of children as they may be dangerous to them. They should also be collected and disposed on in suitably prepared places so that they do no pollute the environment.
- Before carrying out any cleaning or maintenance, switch off the equipment at the mains supply, using the system's switch or shut-off systems.
- If there is any fault or if the equipment is not working properly, deactivate the equipment and do not attempt to repair it or tamper with it directly. In such case get in touch with only qualified technicians. Any product repairs must only be carried out by BALTUR authorised assistance centres using only original spare parts. Failure to act as above may jeopardise the safety of the equipment. To ensure the efficiency and correct working of the equipment, it is essential to have periodic maintenance carried out by qualified technicians following the manufacturer's instructions.
- If the equipment is sold or transferred to another owner or if the owner moves and leaves the equipment, make sure that the booklet always goes with the equipment so it can be consulted by the new owner and/or installer.
- For all equipment with optionals or kits (including electrical), only original accessories must be used.

BURNERS

- This equipment must be used only for its expressly stated use: applied to boilers, hot air boilers, ovens or other similar equipment and not exposed to atmospheric agents. Any other use must be regarded as improper use and hence dangerous.
- The burner must be installed in a suitable room that has ventilation in accordance with current regulations and in any case sufficient to ensure correct combustion

- Do not obstruct or reduce the size of the burner's air intake grills or the ventilation openings for the room where a burner or a boiler is installed or dangerous mixtures of toxic and explosive gases may form.
- Before connecting the burner check that the details on the plate correspond to those of the utility supplies (electricity, gas, light oil or other fuel).
- Do not touch hot parts of the burner. These, normally in the areas near to the flame and any fuel pre-heating system, become hot when the equipment is working and stay hot for some time after the burner has stopped.
- If it is decided not to use the burner any more, the following actions must be performed by qualified technicians:
 - a) Switch off the electrical supply by disconnecting the power cable from the master switch.
 - b) Cut off the fuel supply using the shut-off valve and remove the control wheels from their position.
 - c) Render harmless any potentially dangerous parts.

Special warning notes

- Check that the person who carried out the installation of the burner fixed it securely to the heat generator so that the flame is generated inside the combustion chamber of the generator itself.
- Before starting up the burner, and at least once a year, have qualified technicians perform the following operations:
 - a) Set the burner fuel capacity to the power required by the heat generator.
 - b) Adjust the combustion air flow to obtain combustion yield of at least the minimum set by current regulations.
 - c) Carry out a check on combustion to ensure the production of noxious or polluting unburnt gases does not exceed limits permitted by current regulations.
 - d) Check the adjustment and safety devices are working properly.
 - e) Check the efficiency of the combustion products exhaust duct.
 - f) Check at the end of the adjustments that all the adjustment devices mechanical securing systems are properly tightened.
 - g) Make sure that the use and maintenance manual for the burner is in the boiler room.
- If the burner repeatedly stops in lock-out, do not keep trying to manually reset but call a qualified technicians to sort out the problem.
- The running and maintenance of the equipment must only be carried out by qualified technicians, in compliance with current regulations.



WARNING NOTES FOR THE USER HOW TO USE THE BURNER SAFELY

ELECTRICAL SUPPLY

- The equipment is electrically safe only when it is correctly connected to an efficient ground connection carried out in accordance with current safety regulations. It is necessary to check this essential safety requirement. If in doubt, call for a careful electrical check by a qualified technicians, since the manufacturer will not be liable for any damage caused by a poor ground connection.
- Have qualified technicians check that the wiring is suitable for the maximum power absorption of the equipment, as indicated in the technical plate, making sure in particular that the diameter of cables is sufficient for the equipment's power absorption.
- Adapters, multiple plugs and extension cables may not be used for the equipment's power supply.
- An omnipolar switch in accordance with current safety regulations is required for the mains supply connection.
- The electrical supply to the burner must have neutral to ground connection. If the ionisation current has control with neutral not to ground it is essential to make a connection between terminal 2 (neutral) and the ground for the RC circuit.
- The use of any components that use electricity means that certain fundamental rules have to followed, including the following:
 - do not touch the equipment with parts of the body that are wet or damp or with damp feet
 - do not pull on electrical cables
 - do not leave the equipment exposed to atmospheric agents (such as rain or sun etc.) unless there is express provision for this.
 - do not allow the equipment to be used by children or inexperienced persons.
- The power supply cable for the equipment not must be replaced by the user. If the cable gets damaged, switch off the equipment, and call only on qualified technicians for its replacement.
- If you decide not to use the equipment for a while it is advisable to switch off the electrical power supply to all components in the system that use electricity (pumps, burner, etc.).

GAS, LIGHT OIL, OR OTHER FUEL SUPPLIES

General warning notes

- Installation of the burner must be carried out by qualified technicians and in compliance with current law and regulations, since incorrect installation may cause damage to person, animals or things, for which damage the manufacturer shall not can be held responsible.
- Before installation it is advisable to carry out careful internal cleaning of all tubing for the fuel feed system to remove any residues that could jeopardise the proper working of the burner.
- For first start up of the equipment have qualified technicians carry out the following checks:
- If you decide not to use the burner for a while, close the tap or taps that supply the fuel.

Special warning notes when using gas

- Have qualified technicians check the following:
 - a) that the feed line and the train comply with current law and regulations.
 - b) that all the gas connections are properly sealed.
- Do not use the gas pipes to ground electrical equipment.
- Do not leave the equipment on when it is not in use and always close

the gas tap.

- If the user of is away for some time, close the main gas feed tap to the burner.
- If you smell gas:
 - a) do not use any electrical switches, the telephone or any other object that could produce a spark;
 - b) immediately open doors and windows to create a current of air that will purify the room;
 - c) close the gas taps;
 - d) ask for the help of qualified technicians.
- Do not block ventilation openings in the room where there is gas equipment or dangerous situations may arise with the build up of toxic and explosive mixtures.

FLUES FOR HIGH EFFICIENCY BOILERS AND SIMILAR

It should be pointed out that high efficiency boilers and similar discharge combustion products (fumes) at relatively low temperatures into the flue. In the above situation, traditional flues (in terms of their diameter and heat insulation) may be suitable because the significant cooling of the combustion products in these permits temperatures to fall even below the condensation point. In a flue that works with condensation there is soot at the point the exhaust reaches the atmosphere when burning light oil or heavy oil or the presence of condensate water along the flue itself when gas is being burnt (methane, LPG, etc.). Flues connected to high efficiency boilers and similar must therefore be of a size (section and heat insulation) for the specific use to avoid such problems as those described above.

TECHNICAL-FUNCTIONAL FEATURES

- Industrial dual gas-diesel modulating type burners, with flame regulation, suitable for gas pressures from 150 to 450 mbar (for different values, please contact our sales office).
- Regulation range: 1:4 for gas, 1:4 for diesel oil, 1:4 for fuel oil up to 460 cSt (60°E) at 50°C and 1:3 for dense fuel oil up to 780 cSt (100°E) at 50°C (for different values, please contact our sales office).
- Suitable for installation on any type of furnace, with turbulence regulation register that serves to modify the length and diameter of flame geometry.
- The variation between minimum and maximum flow rate is electronically controlled by a servomotor fitted with a variable profile cam which varies both comburent air flow rate and fuel flow rate. The servomotor varies the heat output through a PID-type electronic adjustment system, while keeping an optimal generator overall heat efficiency rating.
- multiple butterfly-type air shutters for automatic adjustment of comburent air;
- air/fuel flow rate continuous modulation unit, composed of electric servomotor, variable profile cams and relevant controls of air shutters, of gas throttle valve and of fuel pressure control valve, protection casing;
- gas flow rate butterfly valve;
- gas supply unit to gas distributor in combustion head;
- direct current solenoid valve, for opening and closing the fuel nozzle;
- spray nozzle circuit with fuel pre-circulation;
- central return nozzle;
- fuel flow rate regulation by means of pressure gauge and cock;
- ignition with gas pilot burner;
- flame detection device;
- air minimum pressure control pressure switch;
- case containing terminal box for connection to main electric panel, and manual control of modulation;
- electric system with IP55 protection class.

MANUFACTURING CHARACTERISTICS

The burner consists of the following parts:

- body made of painted steel sheet fitted with connection flange and insulating gasket;
- flame pipe made of special steel, resistant to high temperatures;
- air/fuel mixing and combustion head;
- flame disc;
- flame display;

ESSENTIALS FOR PROPER INSTALLATION

Before proceeding with the installation make certain that:

- The chimney (section and height) is suitable for the boiler. In any case, the following considerations always apply:
 - the boiler-chimney coupling pipe must be very short and must rise at a steep angle towards the chimney;
 - external chimneys made of sheeting without a suitable insulation coating are not recommended as they could produce condensation with soot at the outlet. Moreover, the low temperature existing in these chimneys does not ensure a good air draught;
 - The flue pipe shall not have any infiltration of air;
 - the top must be clear of neighbouring obstructions and the cap must be arranged in a way to allow free outlet of combustion gases;
 - in mountain areas the chimney section must be 10% larger for each 500 m in height above the sea level.
 - round sections or square sections with rounded angles are better. In case rectangular sections are used, the ratio between longer and shorter side shall in no way exceed 1.5.
 - It is to be considered that by increasing the height above sea level, the air gets more rarefied. This reduces burner fan efficiency and consequently the burner heat output. The approximate values are shown in the table;
- When installation of a refractory lining is required in the combustion chamber (for certain types of boiler), the material must be installed around the burner combustion head in accordance with the instructions of the boiler manufacturer.
- The power supply for the burner must be wired as shown in our wiring diagram, and the electrical connections on the burner must have the same voltage as the mains.
- The fuel pipelines must comply with our diagrams.
- The nozzle on the burner must be suitable for the boiler output. Under no circumstances should the quantity of fuel supplied be greater than the maximum required by the boiler and that permitted by the burner. Make sure the nozzle spray angle does not cause any inconvenience (putting out of the flame, fouling of disc and combustion head, fierce ignition, etc.); if necessary, replace with a nozzle having a suitable spray. Always keep fuel supply within boiler maximum allowed values.
- Make certain that the burner head penetrates into the combustion chamber according to the instructions of the boiler manufacturer.

Height above sea level in metres	Consequent reduction of heat output in %
1000	- 6%
1500	- 11%
2000	- 16%
2500	- 21%
3000	- 27%
3500	- 32%

REFRACTORY LINING

It should be kept in mind that the boiler manufacturers no longer require a refractory lining in the latest models.

If a lining is necessary around the combustion head of the burner, it must comply with the instructions regarding application of the lining, in accordance with the boiler manufacturer's instructions.

The lining in refractory material on the hatch of the combustion chamber protects the boiler hatch from the high temperatures that develop in the combustion chamber. It also abbreviates the time necessary to reach the proper temperature, optimizing combustion. We recommend using good quality refractory material which can resist temperatures in excess of 1500°C (42 - 44% alumina).

Recommendations for correct installation of refractory material:

- Refractory material lining should be applied only to boiler door. Application in other parts of the combustion chamber would reduce the thermal exchange with the outside, causing deterioration of the boiler combustion chamber.
- Application of excess refractory material in the boiler will cause a significant reduction in the volume of the combustion chamber, preventing optimal combustion due to insufficient volume.

ELECTRIC CIRCUITS

- All electric connections should be made using flexible cable.
- The three-phase power line with neutral must have an adequate cross-section for the power absorbed by the burner.
- The power line must be equipped with a switch with fuses, located on the thermal unit near the burner.
- All electric lines must be sheathed and must not be placed near high temperature heat sources.
- Make sure the voltage and frequency of the power supply are adequate for the burner.

For further details refer to the specific wiring diagrams.

CONNECTING THE BURNER TO THE GAS SUPPLY PIPE

- Fasten the burner to the boiler, making sure the combustion head of the burner penetrates inside the combustion chamber to the depth indicated by the boiler manufacturer.
- Connect the burner to the gas pipeline. We recommend installing a twin-flange union on the pipe, as close as possible to the burner, to facilitate opening the boiler hatch and/or to dismantle the burner. Before closing this union, vent any air in the gas pipeline, with due precautions and with doors and windows open.
- Before igniting the burner it is absolutely essential to check that the gas pipeline has been sealed perfectly

(NATURAL) GAS SUPPLY SYSTEM FROM MEDIUM PRESSURE MAINS

When a large quantity of gas has to be supplied, the gas company requires users to install a control unit with a pressure reducer and meter, and makes the connection to the medium pressure mains (several bar).

The pressure reducer on the control unit must be of the correct size

to supply the maximum quantity required by the burner at its specified operating pressure.

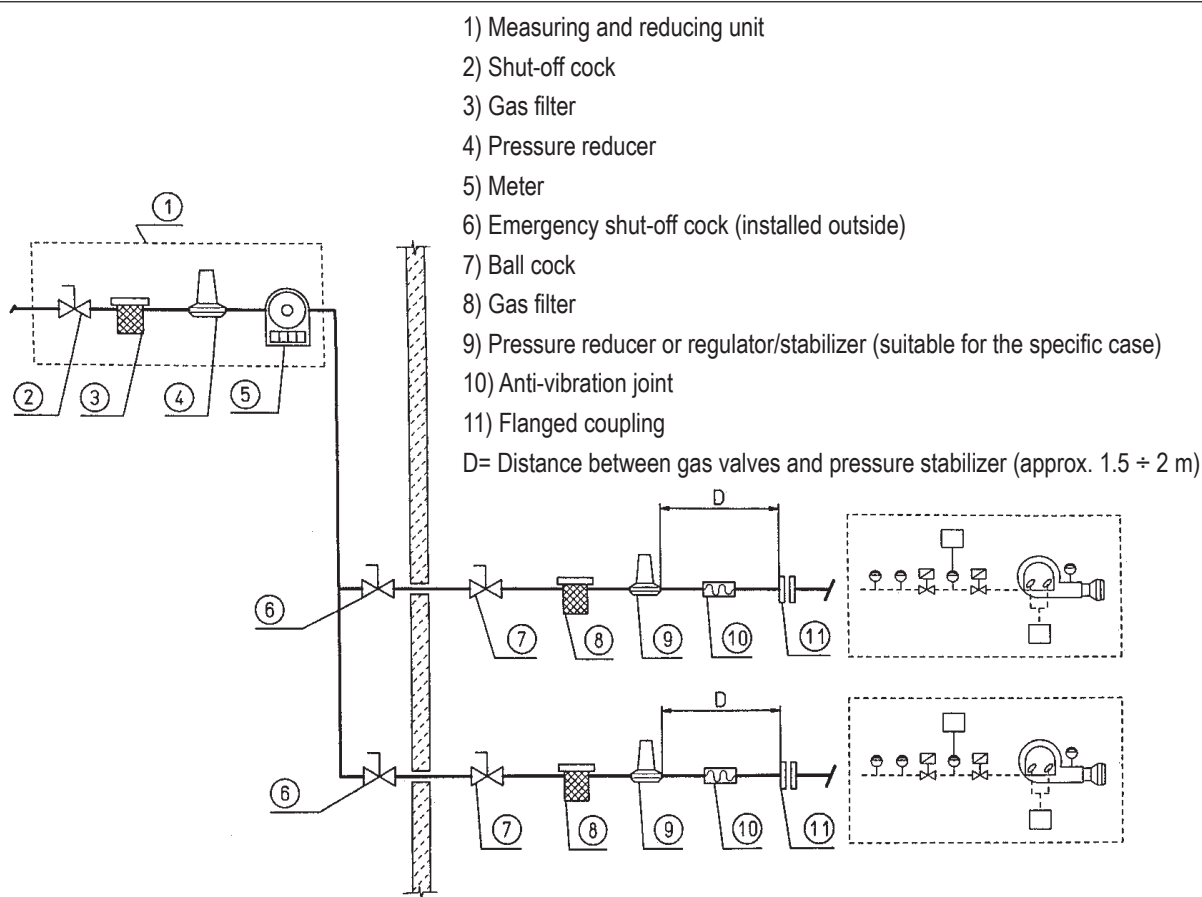
We recommend using a large reducer to attenuate the considerable increase in pressure when the burner shuts down on receiving a high quantity of gas (the relative standards specify that the gas valves must close in less than one second).

It is recommended to use a reducer with a supply rate (m³/h) more or less twice the maximum supply designed for the burner. If you have several burners, each must have its own pressure reducer. This condition makes it possible to maintain constant gas supply pressure to the burner, regardless of whether one or more burners are in function, optimising combustion and improving output.

The gas pipeline must be of adequate size depending on the amount of gas it has to supply; we recommend maintaining the load loss within a moderate range.

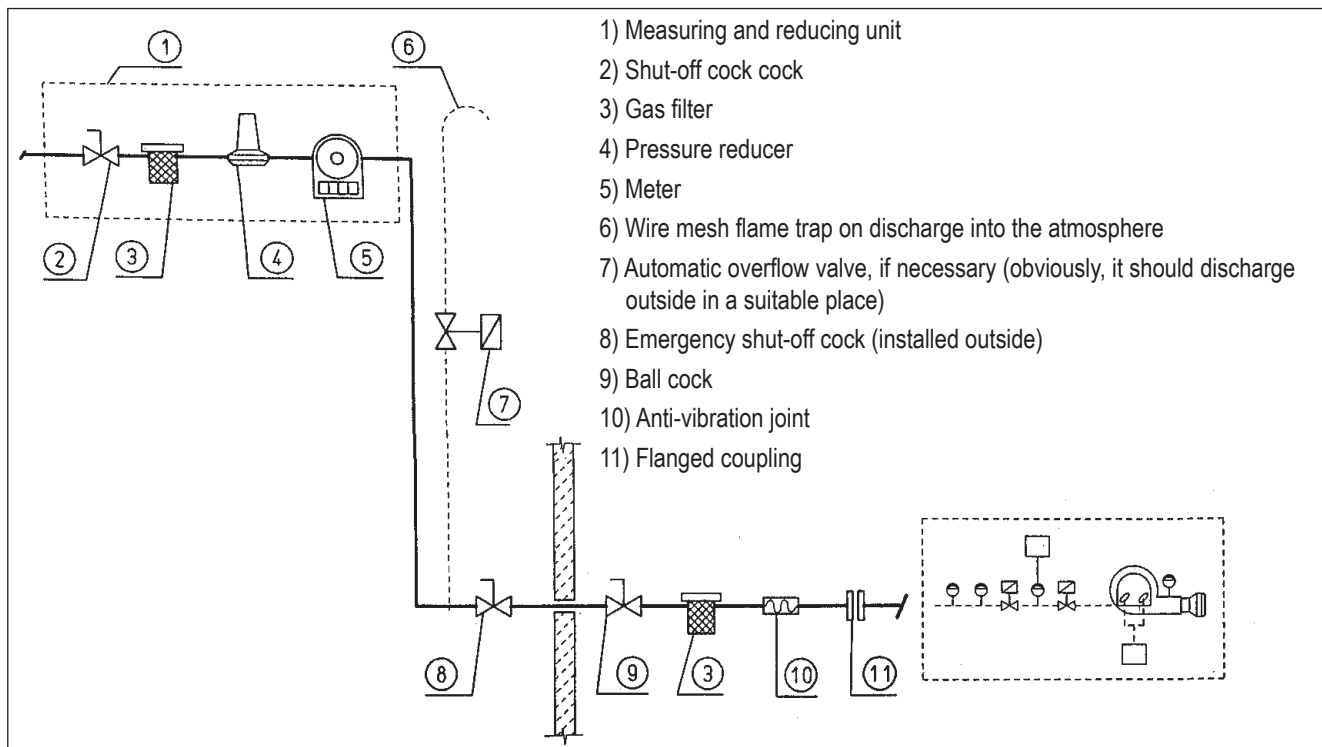
Consider that the load loss is added to the existing pressure when the burner shuts down, so that the next ignition will be made at a higher pressure the greater the load loss of the pipeline. If you expect (or subsequently discover) that gas pressure reaches unacceptable values when the burner shuts down (rapid shutting of the gas valves), an automatic exhaust valve with an appropriate cross-section should be installed between the reducer and the first burner valve to vent the gas into the open air. Make sure the pipe conveying the gas into the open air ends in a suitable place, and is protected against rain and fitted with a flame trap. Adjust the exhaust valve so that it fully discharges any excess pressure.

CONNECTION DIAGRAM OF MULTIPLE BURNERS TO THE MEDIUM PRESSURE GAS SUPPLY NETWORK



N° 8530-1

CONNECTION DIAGRAM OF ONE BURNER TO THE MEDIUM PRESSURE GAS SUPPLY NETWORK



ELETTROGAS PILOT GBP 40

Blown air pilot burner with electrode for ignition incorporated on the inside, complete with air-gas premixer with adjustment of the gas intake sent to the pilot burner.

Particularly recommended for pressurized combustion chambers.

To ignite the burner, use a pilot burner operating with LPG or methane at 0.5 bar.

The pilot is equipped with two systems for gas adjustment:

- Primary gas adjustment (air/gas mixture) (1) serves for the preparation of the primary air-gas mixture that forms the initial part of the flame dart output.
- Pure gas adjustment (2) serves to convey the pure gas directly to the flame to regulate its length or geometry.

There is also a mechanism for adjusting the combustion air of the primary gas (3) so as to measure it out exactly. To ignite the pilot gas, a high voltage ignition electrode is installed (9). The voltage that reaches this electrode (see part. X4) must be at least 8 kV - 20 mA.

IGNITION: CALIBRATION OF PILOT BURNER

- Make sure the gas is at 0.5 bar.
- Make sure the secondary pure gas regulator is closed.
- Make sure air arrives through the pilot air regulator.
- Regulate the primary gas and air (1 and 2) during the spark discharge until you observe a stable flame on the pilot outlet (if this takes more than 1 minute, wait three minutes before trying again).
- Adjust the pure gas regulator (2) at this point, to increase the

volume of the flame as needed.



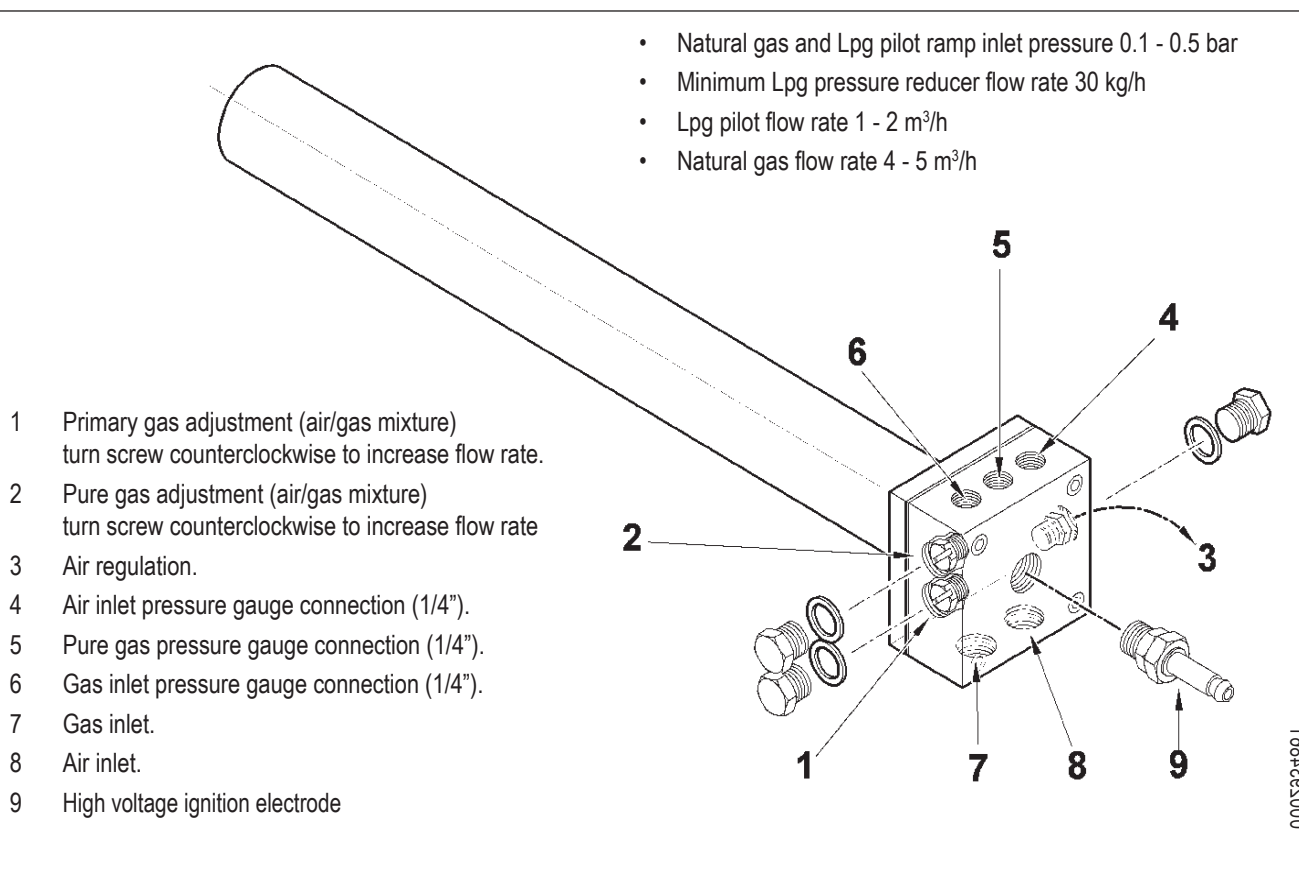
THE TOTAL PILOT FLOW RATE EQUALS THE SUM OF THE GAS FLOW RATE OF THE PREMIXED FLAME AND THE PURE GAS FLOW RATE TO THE PILOT BURNER.

The regulation operations described must be performed withdrawing the control and check equipment from the base and electrically powering the blower motor, the ignition transformer and the pilot gas valve YPL - YSP (see wiring diagram). Do not leave the ignition transformer on for more than 30 seconds.



in these conditions, the flame control is not operational. Do not keep gas valves open if pilot flame is not present. After adjusting the pilot gas flame, restore the initial connections.

GAS PILOT GBP 40



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DESCRIPTION OF OPERATION WITH NATURAL GAS

For correct operation it is essential for the gas (methane) to reach the burner at the pressure required by the gas train; this pressure must remain practically constant during operation and stoppage of the burner.

When the burner power supply switches are tripped, the motor of the cyclic programmer is powered and the programmer begins to operate. Ignition is preceded by pre-ventilation of the combustion chamber. Pre-ventilation with minimum air, regulated position; pre-ventilation time is only as designed for the equipment, i.e. about 31.5 sec.

If the ventilation air pressure is insufficient, the control pressure switch will be tripped.

After the ventilation stage, the ignition transformer discharges and then the valves open to ignite the (pilot) flame. The gas reaches the combustion head, is mixed with air supplied by the fan and ignites. Flow is regulated by the flow regulator incorporated in one of the two ignition flame valves (pilot). Three seconds after the pilot flame has been ignited, the ignition transformer cuts out. The burner is thus operating on the pilot flame alone.

Flame presence is detected by the UV photocell.

The programmer relay overrides the lock-out position and, after 12 seconds, powers the main valves, which open. The gas flows through the main valves and out the combustion head in the amount permitted by the "minimum" position of the flow regulator.

The pilot circuit cuts out 3 seconds after the main valves open. The burner is on, in this case with the main flame only, at the minimum capacity.

The modulation servomotor is started 12 seconds after the main valves are opened and, with the consent of the thermostat and modulating pressure switch (set to a temperature or pressure value higher than that in the boiler), begins to turn, thus gradually increasing gas supply and combustion air until the maximum supply level set for the burner is reached.

The burner remains in the maximum flow position until the temperature or pressure are high enough to trip the modulation probe, which reverses the rotation of modulation servomotor. Reduction of the supply occurs shortly thereafter. With this procedure, the modulation system attempts to balance the amount of heat supplied to the boiler with respect to the amount the boiler releases for use. From this point on, the modulation probe installed on the boiler measures any variation requests and automatically adjusts fuel and combustion air supply, by starting the modulation servomotor and increasing or reducing rotation as necessary.

If the limit value (temperature or pressure) at which the stop device is set (thermostat or pressure switch) is reached even with gas supply at minimum level, the burner is shut down by the device.

When temperature or pressure returns below the shut-down device tripping value, the burner is activated once again according to the

program described previously.

If the flame does not appear within 3 seconds after the pilot flame is ignited, the control box will go into the lockout condition (the burner shuts down completely and the warning light goes on).



To "resume" the equipment operation press the dedicated button.

Equipment features

Equipment and relevant programmer	Safety time in seconds	Pre-ventilation time with open air shutter in seconds	Pre-ignition (in seconds)	Time between 1st flame and start of modulation in seconds
LGK 16.333 Cycle relay	3	31.5	6	11.5

[illegible]

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FIRST PIPE FILLING AND FIRST IGNITION



In case of dual operation burners, alternating liquid fuel (fuel oil or diesel) and gas fuel (natural gas), it is necessary to ignite and adjust first with the specific liquid fuel designed for the burner (either fuel oil or diesel). Ignition and adjustment with gas fuel (natural gas) is to be carried out only at a later stage. This is necessary since the fuel oil control cam does not have a profile variable to taste. Hence, the combustion air needs to be adjusted to the supply of liquid fuel.

Before starting the specific operations, make sure that the motor, the resistors and the other control devices are suitable for the installed voltage and frequency. Also make sure that all connections have been properly made according to our diagrams.

Make sure that the combustion outlet penetrates the chamber to the extent set by the constructor of the boiler (or furnace) and that the nozzle connected to the burner is suitable for the capability of the boiler and if necessary change it. Under no circumstances should the quantity of fuel supplied be greater than the maximum required by the boiler and that permitted by the burner.

The nozzle spray angle should not cause any inconvenience (putting out of the flame, fouling of disc and combustion opening, fierce ignition, etc.); if necessary, replace with a nozzle having a suitable spray. However, the quantity of fuel supplied shall under no circumstances be greater than the maximum required by the boiler. With our burner fuel supply devices must be operated by means of an auxiliary circuit consequently with the first filling of the piping proceed as described below:

- Start the fuel supply auxiliary circuit and check that fuel is circulating correctly (check pressure and flow rate at least approximately). Remove the vacuum gauge plug connecting to the thrust pump from the burner control unit. Open the gate valves placed on inlet pipe and wait till the fuel flowing out of it is free from air bubbles. When diesel flows out in a continuous way and free from air bubbles, close the gate, apply a vacuum gauge to the pump and then reopen the gate. Check that the pressure shown by the vacuum gauge is $0.5 \div 3$ bar, if necessary, set pressure within the limits given above by adjusting the pressure control valve in the auxiliary circuit. Turn off main switch on the panel, leaving the "S1" burner switch on to prevent any undesired burner start. Set modulation switch to "MAN" (manual) position and "MIN - 0 - MAX" switch to "0" position. Set fuel selector to "Diesel".
- Make sure that the fan motor and that of the pump turn in the correct direction. Pump motor: turn off "S1" switch and then push mobile part of K2 remote switch. Use "START" and "STOP" keys on the inverter to start fan motor manually (see inverter manual supplied). To reverse the direction of revolution, change the position of the two cables in the electric line relevant to the motor turning in the wrong direction.
- Remove the pressure gauge connection point plug so as to safely allow the air contained within the body of the pump to escape and connect for a very short time the pump thrust motor (press the loading tank button). The rotating pump sucks fuel from the inlet pipe and thrusts it to the pre-heater and consequently the air in the pump body is bled through the pressure gauge connection plug. The above described bleeding operation is essential to prevent the pump from turning "dry", which would severely damage

the pump and make it unusable. Close the gate valve on the suction pipe.

- Apply the pressure gauge for pressure check. Make sure the gate valves on the return pipe, if any, are open and re-open the ones located on the suction pipe. Press the loading tank until the pressure gauge, checking the return pressure, connected to the burner regulator, indicates sufficiently high pressure ($4 \div 9$ bar) which in turn indicates the filling of the preheater and the fuel circuits.
- Make sure the chimney damper, if any, is open and that there are no other obstructions along the entire fume discharge route.
- Make sure that in the minimum delivery position the combustion air regulator is sufficiently open to allow the flow of air which is necessary to the ignition flame (small flame). If necessary adjust the opening so as to comply with that mentioned above. The air adjustment on the combustion head consists of a set of blades placed inside the burner heat, just ahead of the combustion outlet. When the burner is ignited, the blades are manually positioned by the technician in such a way as to provide the combustion air with a certain degree of turbulence as it passes through. The shape of the flame can be changed by suitably adjusting the air regulation device at the combustion head. You can create a long, narrow flame or a short, wide one. Obviously, all intermediate conditions are possible. The air register position is set when switching on for the first time according to the type of flame required (which, of course, depends on the size of the combustion chamber). The correct direction of the air register blades is normally to be found experimentally and by trial after igniting the burner and while the burner is working at full flow rate to achieve a flame shape suitable for the furnace. Refer to indication given at the base of the adjustment knob to check position of blades. After setting the blades in the proper position to obtain the required flame shape, secure them by tightening the screws at the base of the knob. In particular:
 - when the blades are set at the maximum inclination the air turbulence is at its highest and, therefore, the flame is short and wide.
 - when the blades are set radially air turbulence is at a minimum and the flame is long and narrow. Obviously, all the positions in between will provide flames with varying intermediate shapes. In practice the best position must be determined by trial and error. It is to be considered that when the blades are at their maximum inclination, the section of combustion air passage is significantly reduced. In this case a compromise might be necessary (by slightly re-opening the air register blades) to obtain an amount of air sufficient for combustion (refer to drawing no. 0002931401). Moreover, we wish to point out that if the turbulence air register is very closed (indicatively less than 2), ignition may be impossible due to excess turbulence. Should this situation occur, it will be necessary to open the register slightly in order to obtain correct ignition and then seek the optimum compromise position in each case by trial and error (correct ignition and suitable flame shape for the combustion chamber).
- When thermostats or pressure switches (safety and boiler) are closed, the command and control equipment will immediately

- start operating. When the command and control equipment start operating, the burner ignition phase is started. The programme provides a pre-ventilation and a pre-circulation phase simultaneously in the whole burner fuel circuit. The burner ignites at minimum delivery. (The gas pilot flame is ignited first, and then the diesel flame is ignited at minimum delivery).
- To set the gas pilot flame, proceed as follows:
 - disconnect wire to terminal No. 19 from LGK... equipment terminal to prevent main flame ignition.
 - Disconnect wire to terminal No. 17 from LGK... equipment terminal (intermittent pilot) and connect it to terminal No. 18 of LGK... equipment. (pilot always turned on).
 - Turn on the burner, adjust the gas and air flow to the pilot flame and check several times to ensure that ignition takes place correctly in all positions of the air register.
 - After completing flame adjustment, switch off power and restore the original connections.
 - Subsequently, switch the burner back on.
- Now the burner is on at minimum fuel supply and remains in this position as the modulation switch is in "MAN" (manual) position and the "MIN - 0 - MAX" switch is in "0" position (see point 1). With the burner in this position it is necessary to check:
 - that the flame colour does not indicate an excess or a shortage of air. The flame must be rather soft and have a light orange colour and be without visible smoke. If necessary, proceed with appropriate regulation of the combustion air.
 - Fuel pressure at pump inlet: the pressure-vacuum gauge must indicate a light pressure (0.5 ÷ 3 bar) both at minimum and at maximum supply.
 - Pump delivery pressure 20 bar.
 - Minimum return pressure 5 ÷ 7 bar.
It is as well likely necessary to check the fuel oil "minimum" delivery adjusted by return pressure regulator. For good combustion remember that the minimum flow of the burner, must not be lower than the minimum indicated on the burner's information plate. Only in special circumstances is it possible to achieve good operation (ignition, combustion, etc.) from the burner with a minimum flow rate lower than that on the information plate. To obtain a good fuel spraying, minimum return pressure should not lie below 5 ÷ 7 bar, see Section "Setting air-diesel flow rate".



With nozzle in "return" mode, given the same return pressure, the supply of fuel will decrease when the delivery pressure to the nozzle increases (pump pressure) and vice versa. This particular behaviour, with this type of nozzle, is certainly not true of all types.

- Now check, with suitable instruments, the combustion characteristics revealing the percentage of carbon dioxide (CO₂), or oxygen O₂, and the smoke opacity. For minimum flow, for which the burner is still set, we advise a level of carbon dioxide that is not lower than 10%, or oxygen not greater than 8%, and smoke opacity not greater than the maximum level permitted. It is also necessary to check whether the burner ignites normally at its current setting. To check correct ignition, switch off the burner using the switch "S1" and have it start again several

times. Ignition must always happen smoothly and without delay.

- Loosen the safety nuts and the relative screws which block the regulator screws used for adjusting combustion air. Connect the modulation switch to the "MAX" position (maximum). Check that the disk that the regulation screws are connected to has travelled at an angle of around 10° C (corresponding approximately to the working space of a screw) and then stop modulation by moving the switch into the "0" position. In this position, check the flame visually and, if necessary, adjust it. Next, use the appropriate instruments to check combustion and, if necessary, modify the previous setting made after a visual check only. The operation described above must be repeated gradually (moving the disc forward by about 10° each time) to check and modify the fuel/air ratio if necessary over the whole modulation stroke. Make sure that the progressive fuel supply is gradual and that the maximum supply is given at the end of the modulation stroke. This is an essential condition for modulation to achieve a good operating gradualness. If necessary adjust the eccentricity of the fuel cam to obtain that which is indicated above. The maximum supply is obtained with a return pressure of approx. 2 ÷ 3 bar lower than the delivery pressure (normally 20 bar, see nozzle diagram). When the air-fuel ratio is good, the value of carbon dioxide (CO₂) should increase in proportion to an increase in supply (as a guide-line this value is at least 10% or O₂ = 8%, at minimum supply up to an optimal value of about 13% or O₂ = 4%, at maximum supply). It is recommended not to exceed a 13% value in CO₂, and not to have a O₂ value below 4%, to avoid operating with an excess or a shortage of air that might cause a significant increase of flue gas opacity for unavoidable causes (changes in combustion air temperature, in atmospheric pressure, small dust deposits in the fan air ducts, etc.). Resulting smoke opacity is strictly linked to the type of fuel used. We advise maintaining smoke opacity at the lowest possible levels on the BACHARACH scale. Reduced smoke opacity soils the boiler less and the average efficiency of the latter is normally higher even if CO₂ is slightly lower, or O₂ slightly higher.
- With the burner operating at maximum flow, make sure that smoke temperature does not exceed the maximum permissible level indicated by the boiler manufacturer.
- With the burner at maximum flow, check the readings of the hand-vacuum-meter at the pump inlet as described in point 10 part b.
- At this point, tighten the small screws against the regulation screws. Then lock them with the safety nuts to prevent them from being accidentally loosened. Once this operation has been completed, re-check flame appearance at the various modulation positions, at least visually. This check should be performed both while the modulation is being "increased" (MAX symbol) and "decreased" (MIN symbol). If necessary, correct and check the combustion characteristics once more using the appropriate instruments.
- Now check the efficiency of automatic modulation by turning the "AUT-MAN" switch to the "AUT" (automatic) position. With this setting the modulation function will cut in automatically only in response to requests from the boiler probe.
- The air pressure switch has the purpose of switching the equipment into the safety (shut-down) state if the air

- pressure is not what it should be. The pressure switch must therefore be set to close the contact (closed during operation) when air pressure in the burner is sufficient. Pressure switch connection circuit features a self-control function. Hence the contact designed to close when the unit is in rest condition (fan not moving and consequently no air in the burner) must actually achieve this condition. If this is not the case, the command and control device will not be activated (burner will not start). Please note that if the contact meant to be closed during operation does not close (insufficient air pressure), the equipment carries out its cycle but the ignition transformer is not switched on and the fuel valves do not open. As a result, the burner stops in a blocked state. To verify that air pressure switch is operating correctly, while the burner is ignited on first flame only, increase the adjustment value until the switch triggers an instant “blocked” stoppage of the burner. Release the burner by pushing the appropriate button and readjust the pressure switch until pre-ventilation air pressure can be detected.
- Check the efficiency of the safety devices.
 - Flame control: UV photocell.
When the flame is detected by the UV cell, remember what specified below. A slight amount of grease will strongly compromise the passage of the ultraviolet rays through the UV photocell bulb, preventing the internal sensitive element from receiving the quantity of radiations required for proper operation. In case the bulb is fouled with diesel, fuel oil, etc., it is necessary to clean it properly. It is to be pointed out that even the simple contact with your fingers can leave a slight amount of grease that is enough to compromise the operation of the UV photocell. The UV photocell does not “detect” daylight or the light from a common lamp. Its sensitivity can be tested using a flame (lighter, candle) or an electric shock generated between the electrodes of a common ignition transformer. To ensure correct function, the UV photocell voltage must be relatively stable and must not drop below the minimum value for the specific equipment. It may be necessary to determine by trial and error the best position of the photocell body by changing its position (axial shift or rotation) in order to obtain a sufficient running value. Check by placing a micro-ammeter with adequate scale, in sequence with one of the two connecting wires of the photocell; obviously the correct polarity (+ and -) must be observed when connecting the micro-ammeter. Use an analogue instrument (with dial) not a digital one. The value of the cell current necessary to ensure correct operation of the appliance is shown on the wiring diagram.
 - Limit devices:
thermostat - pressure switch - level switch- flow switch and any other devices. Make sure that activating each device causes the burner to shut down. In addition, check whether the devices require manual resetting, if limit device features this function.
 - The minimum gas pressure switches (and the maximum, if necessary) prevent the burner from operating when gas pressure is not between the expected range. The specific function of the pressure switches clearly reveals that the pressure switch for controlling minimum pressure must use the contact which is closed when the pressure switch detects a pressure value above the value it is set to, while the

pressure switch for controlling maximum pressure must use the contact that is closed when the pressure switch detects a pressure lower than the value it is set to. Both the minimum and maximum pressure switches must be regulated when the burner is switched on as this setting depends on the pressure of individual systems. Hence, it is necessary to check that the triggering (i.e. circuit opening) of the _gas pressure switch prevents the burner from operating.

FUEL (DIESEL) SUPPLY SYSTEM

The burner pump must receive the fuel from a suitable supply circuit featuring an auxiliary pump which may be fitted with a pressure regulator adjustable from 0.5 to 3 bar (8868/2). In this case, the fuel supply pressure to the burner pump ($0.5 \div 3$ bar) must not change either with burner off or with working burner at the maximum fuel supply required by the boiler. The supply circuit must be realized according to our diagrams.

This circuit can be carried out without pressure regulator for a single burner, applying the specific block diagram 8911/1. If more burners are provided, refer to block diagram 8868/2.

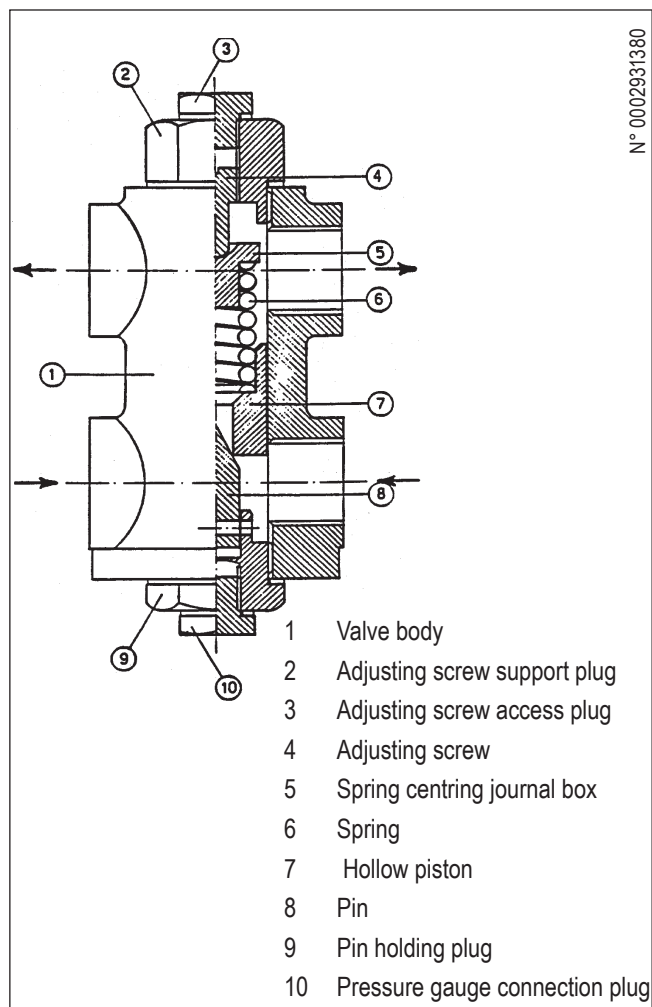
The dimension of the pipelines should be in function with their length and with the output of the pump utilized. Our instructions cover the basic requirements needed to ensure efficient operations.

The anti-pollution prescriptions, as well as the provisions set forth by the local authorities, refer to the specific publications.

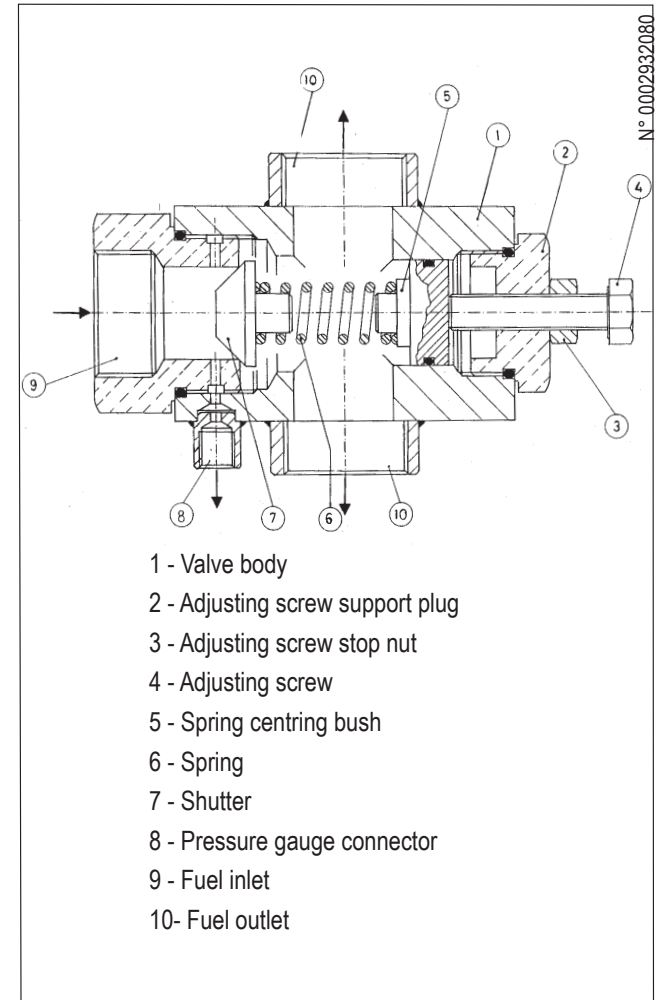
DUAL FUEL BURNER IGNITION INFORMATION:

We recommend performing the first ignition with liquid fuel because, in this case, the output is conditioned by the nozzle that is used, whereas the output of natural gas can be varied as required by regulating the flow rate regulator.

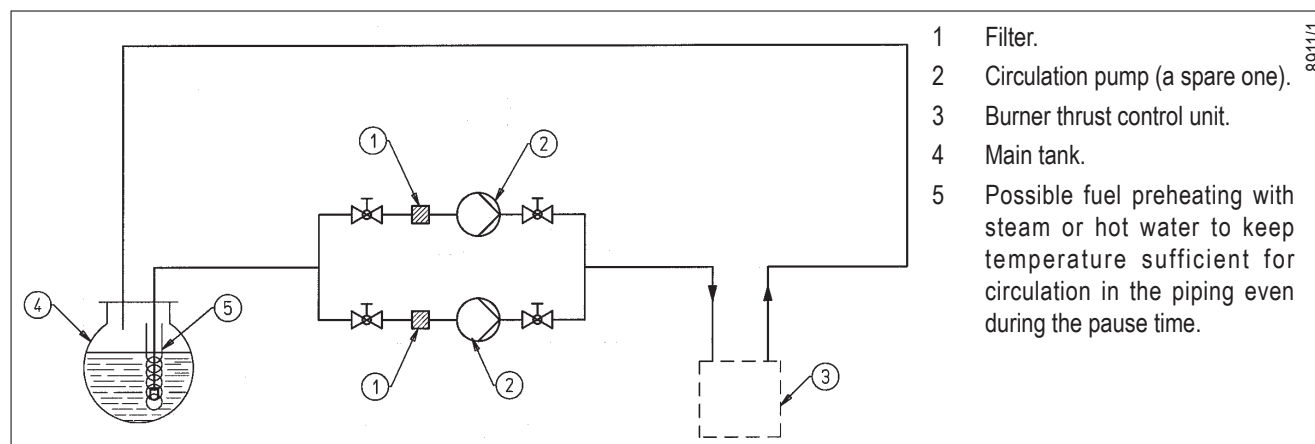
DETAILS OF FUEL PRESSURE ADJUSTING VALVE



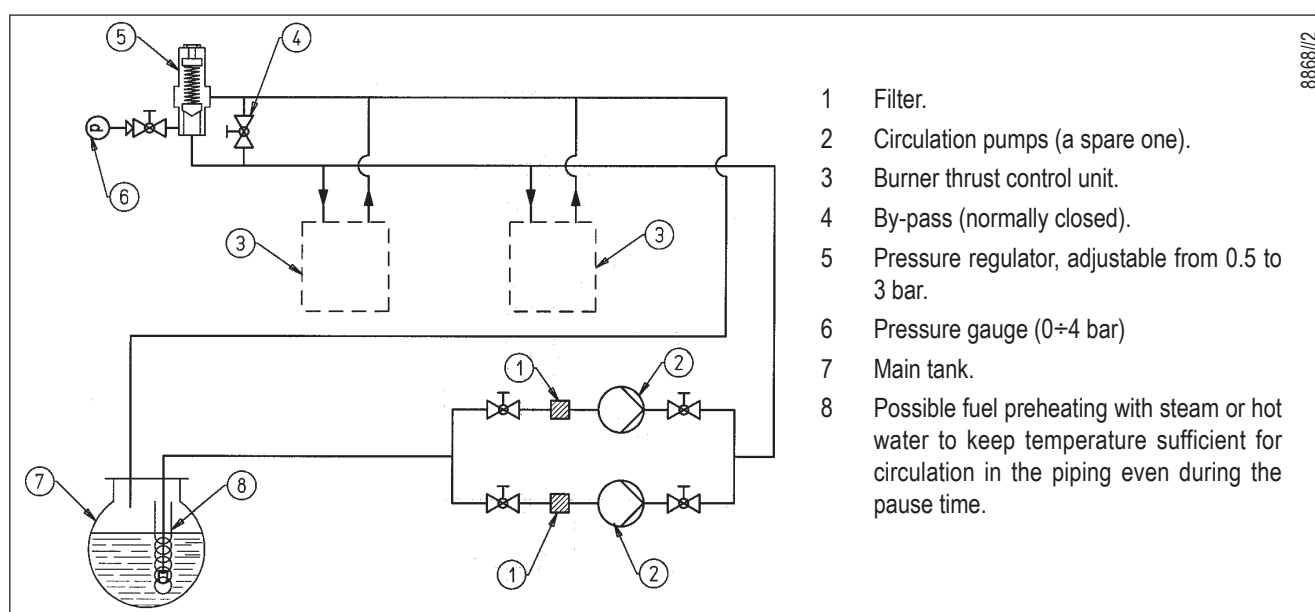
DETAILS OF FUEL PRESSURE ADJUSTING VALVE FOR AUXILIARY CIRCUIT



HYDRAULIC BLOCK DIAGRAM OF SINGLE BURNER SUPPLY SYSTEM (RING-TYPE CIRCUIT) TO BE MADE BY INSTALLER



HYDRAULIC BLOCK DIAGRAM OF MULTIPLE BURNERS SUPPLY SYSTEM (RING-TYPE CIRCUIT) TO BE MADE BY INSTALLER



MAINTENANCE (DIESEL BURNER)

If the burner is installed in a suitable place and appropriate fuel is used, frequent maintenance is not necessary. Obviously it is necessary to clean the line filter periodically, that connected to the piping between the preheater and the nozzle, the combustion head, the disk and the electrodes.

To clean the combustion head, it first needs to be dismantled. Care should be taken during reassembly to centre the combustion head exactly and check the correct position of electrodes and disk. The frequency of these operations can only be established by use since it mainly depends on the fuel and type of system (duty cycle).

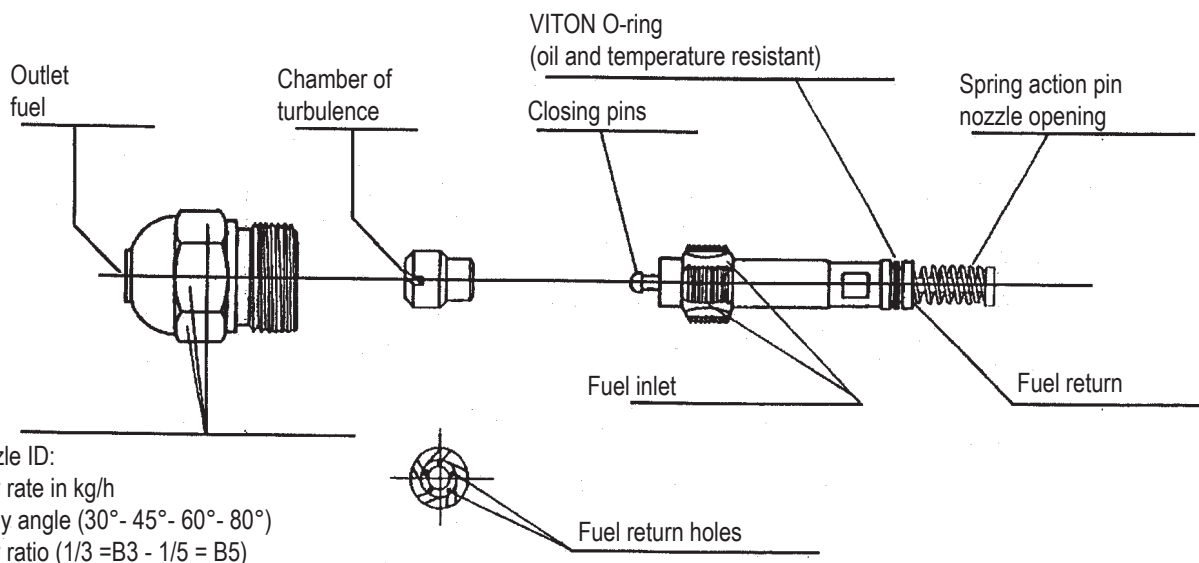
We recommend carrying out initial checks on a weekly basis and then scheduling as required. We also recommend, though it is outside our specific province, checking the cleanliness of the boiler at the same time the burner is inspected.

We underline that the nozzle wears out with the passing of the fuel, consequently, it must be replaced regularly when needed (bad

combustion, violent ignition, etc).

The frequency of replacement is determined mainly by the type of fuel used (with impurities) and the high temperatures that the nozzle must reach, when the burner is inactive the radiation of possible refractory material still hot.

We remind that the cleaning of the nozzle should not involve metallic tools which could cause irreversible effects to performance. We advise using solvents (trilene, petrol, diesel oil, oil) with compressed air, when greater force is necessary use a piece of wood (stick, chip) or a piece of suitable plastic. Clean the flame sensor (UV photocell) as required.



Nozzle ID:
Flow rate in kg/h
Spray angle (30° - 45° - 60° - 80°)
Flow ratio (1/3 = B3 - 1/5 = B5)

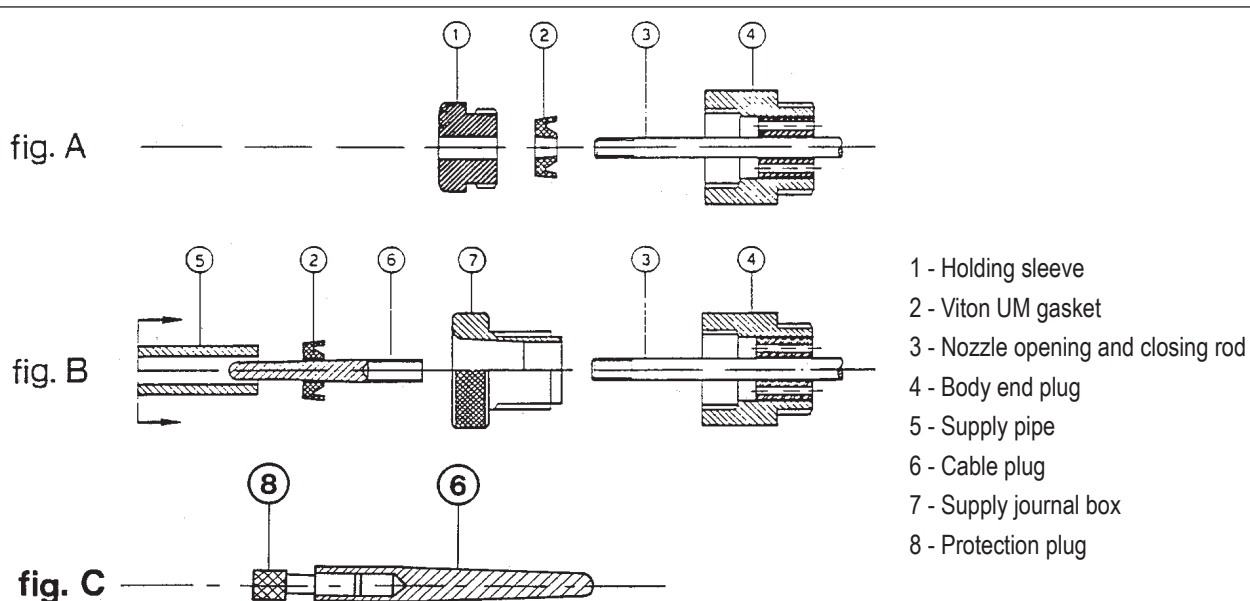


For proper nozzle operation, it is important that the "return" line is never fully closed. This is achieved by setting the system correctly upon igniting the burner for the first time. When the nozzle is operating at maximum desired supply, it is therefore essential that the pressure difference between "delivery" to nozzle (pump pressure) and "return" from nozzle (pressure to return pressure regulator) is at least 2 ÷ 3 bar.

Example:

Pump pressure	20 bar	22 bar
Return pressure	20 - 2 = 18 bar	22 - 3 = 19 bar
	20 - 3 = 17 bar	22 - 2 = 20 bar

DETAILS DISASSEMBLY AND ASSEMBLY OF A "UM" GASKET IN THE NOZZLE ROD



GENERAL INFORMATION

The UM (2) gasket is designed to ensure an airtight seal of the combustion head behind the nozzle rod. When the gasket has been disassembled it must NOT be reused and is replaced with a new one. The assembly must be carried out carefully to preserve the lip of the washer (2) from cracking or abrasion which could compromise the airtight seal.

DISASSEMBLING FIG. "A"

- Check the distance between the thrust cylinder and the control lever, this distance should be restored to exactly the same amount after the assembly. Unscrew the blocking nut and screw down the thrust cylinder and the end of the opening and closing nozzle rod.
- Release the control lever.
- Unscrew and remove the holding sleeve (1).
- Remove existing NON REUSABLE gasket (2).
- Clean carefully the nozzle opening and closing rod (3).

ASSEMBLING FIG. "B"

- Screw down the supply journal box (7).
- Couple the cable plug (6) to the nozzle opening and closing rod (3).
- Fit gasket (2) onto cable plug (6) as shown in figure B, then push it to its seat, sliding it on the cable plug (6) into the journal box (7), using pipe (5). Push gradually until gasket (2) is in contact.
- Separate the cable plug (6) and unscrew the journal box (7).
- Replace the holding sleeve (1).
- Reassemble the control lever, the thrust cylinder blocking it with the appropriate nut checking the distance as mentioned in point 1.
- Insert the protection plug (8) in the cable plug (5) to keep it intact while it is not being used (see figure C). Lubricate now and again the two plugs, avoiding damaging the surfaces.



IT IS IMPORTANT to check and maintain the clearance between thrust cylinder and control lever. This clearance should be detectable on touching the control lever. Without this clearance there is the danger of oil leakage from the nozzle in the furnace when the burner is in stop mode.

REMOVING THE "ROD" (0002931820)

The operation must be carried out only after having disconnected current to the main switch. To limit fuel oil spillage and burning the operator, due to hot oil discharges, it is advisable to proceed as explained below.

- Disconnect the power to remove the heating resistors and intercept the flow of hot fluids (hot water, steam, diathermal oil), from the heating coil of the preheater.
- When the preheater is cold enough (temperature lower than 80° C, usually) close the gate valve on the fuel oil inlet and return pipe.

- Unload a few litres of fuel from the discharge tank of the preheater.
- Unload residual pressure by manually opening the closing pin on the nozzle (push the shaft of the magnet to the bottom) for a few seconds. When the pressure gauge fitted to the burner does not indicate pressure, this means that there is no more pressure in the circuit. When the nozzle closing pin is in an open position, there will be no discharge of fuel from the nozzle (check this situation by looking closely at the nozzle, after having removed the cover from the burner body).
- Check the degree of distance 11, which must be restored during assembly.
- Unscrew the blocking nut 5, and the thrust cylinder 4.
- Remove the screws - connecting pin 9 and 10.
- Release the control lever 3.
- Unscrew the holding screws 7, do not lose the relative split washers.
- Lift the "rod" from the support base and extract it together with the disk and the electrodes.

DISASSEMBLY OF THE NOZZLE (0002931820)

During the disassembly of the nozzle from the rod, it is necessary to avoid pushing the nozzle closing pin against the control shaft housing 2 pushed by the strong closing spring. Operate as described below.

- Screw down the thrust cylinder 4 on the control shaft 2 and block it with nut 5.
- Insert a tool (pliers, spanner) between the thrust cylinder 4 and the rod body so as to hold shaft 2 slightly back.
- While an assistant works to hold shaft 2 slightly back, activate the magnet and the nozzle unscrews from its housing.

NOTE FOR CLEANING AND CHECKING NOZZLE (9076/1 - 0002931820)

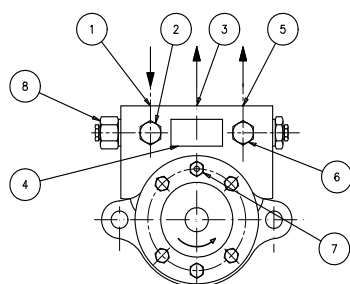
To clean the nozzle it is necessary to disassemble it from its components and then clean them with fuel oil solvent ((trilene, petrol, diesel oil, oil), when greater force is necessary use a piece of wood (stick, chip) or a piece of suitable plastic. Check with particular care that the outlet hole, the notches of the turbulence chamber and the small fuel return holes, located at the bottom of the turbulence chamber, are clean. If there are any signs of wear, the nozzle must be replaced completely. Before reassembly of the nozzle, check on the rod that the special rubber (VITON) O-ring, which is resistant to oil, is perfectly integrated and has sufficient elasticity to seal when the nozzle is inserted in its housing. If the O-ring is cracked or the rubber has lost its elasticity is essential to replace the O-ring. During the reassembly of the nozzle, on the rod it is necessary to move the control shaft 2 back to avoid that the closing pin is pushed against the housing, proceeding as

described before for disassembly. Before reassembling the rod onto the burner, follow the procedure for disassembly in reverse. It is essential to replace the O-ring (with special rubber VITON, which is resistant to oil, or with TEFLON) which are connected to the two cables in which the two inlet and outlet nipples of the fuel rod are inserted. Remember that is essential to maintain a slight distance ($0,5 \div 1 \text{ mm.}$) between the thrust cylinder 4 and the control lever 3, to ensure that in a resting position, the nozzle closes perfectly.

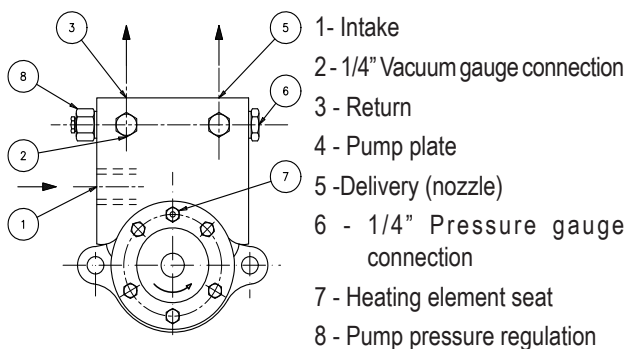


A nozzle closing device which is not perfectly efficient may cause serious accidents with obvious consequences.

HP 2000 PUMP CONNECTION DIAGRAM

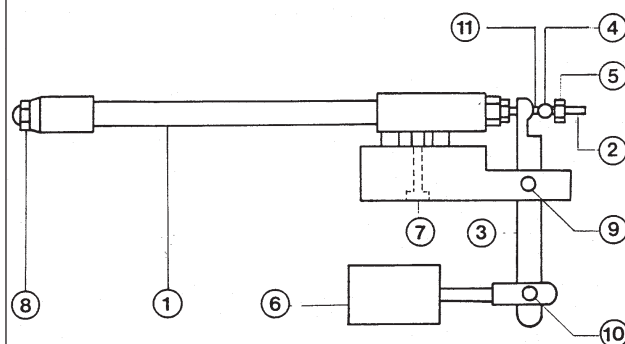


COD.0005060020 - BALTUR 300/HP NVBGRP-D4-20
 COD.0005060022 - BALTUR 450/HP NVBGRM-D4-20
 COD.0005060021 - BALTUR 700/HP NVBGRG-D4-10



COD.0005060070 - BALTUR 1000/HP VBHRP-D4-10
 COD.0005060071 - BALTUR 1500/HP VBHRM-D4-10
 COD.0005060072 - BALTUR 2000/HP VBHRG-D4-10
 COD.0005060073 - BALTUR 3000/HP VBHGRP-D4-10
 COD.0005060074 - BALTUR 4500/HP VBHGRM-D4-10
 COD.0005060075 - BALTUR 6000/HP VBHGRG-D4-10

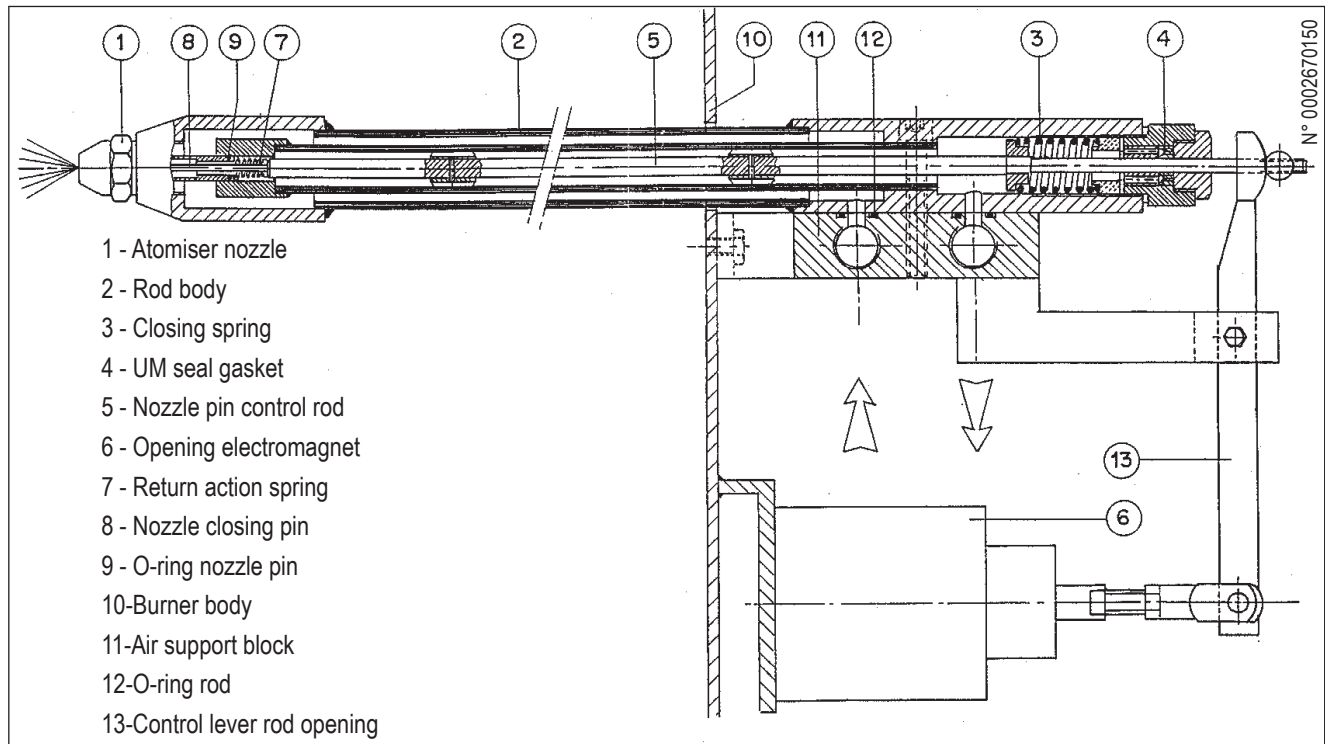
ATOMISER UNIT (ROD) AND LEVERING OF NOZZLE OPENING



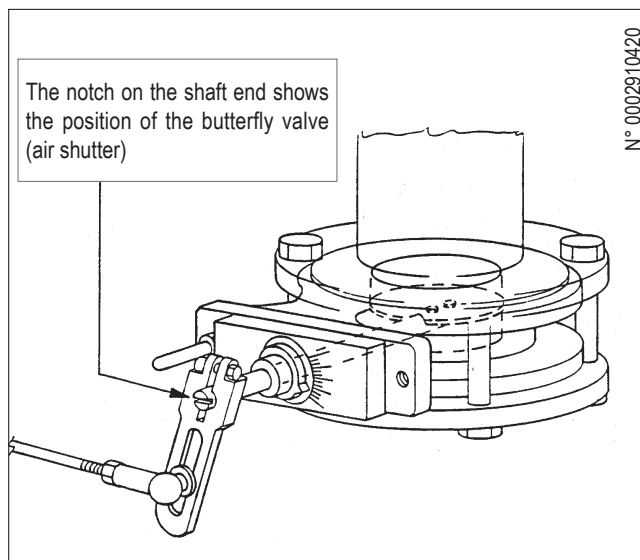
- 1 - Polariser (rod)
- 2 - Closing nozzle control shaft
- 3 - Control lever
- 4 - Thrust cylinder
- 5 - Blocking nut
- 6 - Magnet
- 7 - Holding screw for split washer
- 8 - Nozzle
- 9 - Screw - connecting pin
- 10 - Screw - connecting pin
- 11 - Distance between thrust cylinder and control lever

N° 0002931820

NOZZLE ROD FOR MODULATING BURNER



DETAIL OF THROTTLE VALVE FOR GAS FLOW REGULATION



FIRST IGNITION WITH NATURAL GAS

- Make sure the fan motor rotation direction is correct. Use "START" and "STOP" keys on the inverter to start fan motor manually (see inverter manual supplied). To reverse rotation direction, change the places of two wires in the power supply line.
- Loosen the coupling between the burner and the gas supply pipe and slowly open the manual interception cock (by about 1/4 of its stroke) in order to vent the air from the pipeline. During this procedure, check also that the pressure downstream of the reducer remains at the specified value (see the technical specifications). If not, take suitable measures. (If necessary, ask the Gas Board personnel to help). When gas starts to flow out, close the cock.

! During these operations proceed with the utmost care to prevent accidents or explosions (do not smoke, do not light naked flames, do not use tools that might generate sparks, etc.). Ventilate the room for at least ten minutes, opening doors and windows, to allow ventilation to remove the gas before starting any other work. Then close the gas pipe connection fitting.

- Make sure the chimney damper, if any, is open and that there are no other obstructions along the entire fume discharge route.
- Make sure that at the minimum delivery position, the combustion air and the gas shutters are in the correct position to allow the flow of air which is necessary for the minimum modulation flame. Change air shutter opening if necessary. The air adjustment on the combustion head consists of a set of blades placed inside

- the burner heat, just ahead of the combustion outlet. When the burner is ignited, the blades are manually positioned by the expert so as to provide the combustion air with a certain degree of turbulence as it passes through. The shape of the flame can be changed by suitably adjusting the air regulation device on the combustion head. You can create a long, narrow flame or a short, wide one. Obviously, all intermediate conditions are possible. The air register position is selected upon the first ignition depending on the desired flame type. The correct direction of the air register blades is normally to be found experimentally and by trial after igniting the burner and while the burner is working at full flow rate to achieve a flame shape suitable for the furnace. The blade position can be discerned from the indication at the base of the flame adjustment knob. After setting the blades in the proper position to obtain the required flame shape, secure them by tightening the screws at the base of the knob.

- i** when the blades are set at the maximum inclination, air turbulence is at its maximum and the flame is short and large;
- i** when the blades are set radially air turbulence is at a minimum and the flame is long and narrow.

It is to be considered that when the blades are at their maximum inclination, the section of the combustion air passage is significantly reduced. In this case, a compromise might be necessary (by slightly re-opening the air register blades) to obtain an amount of air sufficient for combustion. Note that with the air register only very slightly open (approx. $< 2^\circ$), ignition would not be possible due to excess turbulence. Should this situation occur, it will be necessary to open the register slightly in order to obtain correct ignition and then seek the optimum compromise position for the case by trial and error (correct ignition and suitable flame shape for the combustion chamber).

- Make sure the combustion air and gas pressure switches are set to a value suitable for the burner being used. Modify the setting if necessary.
- Open the manual command valves on the pilot burner pipes, on the main pipeline and on the gas pressure reduction unit.
- Install a pressure gauge with adequate scale on the pressure outlet of the gas pressure switch. If the level of pressure is sufficient, it is preferable to use a water column instrument; do not use dial instruments for low pressures.
- Set the modulation switch to "MAN" (manual) and switch on the master switch "Q1" and the "S1" start/stop switch. The control equipment is now powered and the programmer starts the burner as described in the chapter "Description of operation".
- To set the gas pilot flame, proceed as follows:
 - Disconnect wire to terminal No. 19 from LGK... equipment terminal to prevent main flame ignition.
 - Disconnect wire to terminal No. 17 from LGK... equipment terminal (intermittent pilot) and connect it to terminal No. 18 (pilot always turned on).
 - Ignite the burner, adjust the amount of gas and air for pilot flame, checking repeatedly that ignition is correctly performed in each position of air turbulence regulation.

- After completing flame adjustment, switch off power and restore the original connections. Subsequently, switch the burner back on.

During pre-ventilation, make sure that the air pressure switch changes its status (from the closed position without pressure measurement to the closed position with pressure measurement). If the pressure switch does not detect sufficient pressure (and does not change status), neither the ignition transformer nor the pilot flame gas valve are activated and the equipment shuts down. However, an occasional lock-out during the first stage of ignition is normal, as air is still present in the valve train pipeline. The air must be vented to obtain a stable flame. To release, press the "reset" key.

UV CELL Flame detection is made by UV cell. Even slight greasiness will greatly interfere with passage of the UV radiation through the bulb of the UV photocell, which is the sensitive internal element, preventing it from receiving the necessary amount of radiation necessary to function. If the bulb is fouled with diesel oil, fuel oil, etc., it must be suitably cleaned. Even contact with the fingers can leave a slight greasy film, enough to affect the function of the UV photocell. The UV photocell does not "detect" daylight or the light from a common lamp. Sensitivity can be checked with a flame (cigarette lighter, candle) or with the spark between the electrodes of a common ignition transformer. To ensure correct function, the UV photocell voltage must be relatively stable and must not drop below the minimum value for the specific equipment. It may be necessary to determine by trial and error the best position of the photocell body by changing its position (axial shift or rotation) in order to obtain a sufficient current value. Check by placing a micro-ammeter with adequate scale in series with one of the two connecting wires of the photocell; obviously the correct polarity (+ and -) must be observed in connecting the micro-ammeter. Use an analogue instrument (with dial) not a digital one. The value of the cell current necessary to ensure correct operation of the appliance is shown on the wiring diagram.

- With the burner operating at minimum level (main flame valves open and modulation regulator on minimum), make an immediate visual check of the size and appearance of the flame, correcting if necessary (to adjust use the screws on the modulation device which control gas or air supply). Subsequently, check the amount of gas supplied by reading the meter, see the chapter entitled "Meter reading". If necessary, correct the gas flow by turning the screws that control the gas supply valve. Subsequently check combustion with the special instruments. To obtain a correct air-to-gas ratio, the value of carbon dioxide (CO_2) should increase in proportion to an increase in supply. As a guide-line, this value for natural is at least 8% at minimum fuel delivery to the burner, up to an optimal value of 10% at maximum fuel delivery. We recommend not exceeding a CO_2 value of 10%, so as not to operate with limited excess air (e.g. due to variations in combustion air temperature, atmospheric pressure, presence of small deposits of dust in the fan air duct, etc.) which could cause a marked increase in CO (carbon monoxide). It is essential to check, with a suitable instrument, that the percentage of carbon monoxide (CO) present in the fumes does not exceed the maximum admissible limit of 0.1%. The gas pressure at the burner must be as required. If necessary, adjust the pressure reducer setting to obtain the value required by the burner,

- requesting the intervention of the gas company where needed. Make sure the burner is able to ignite regularly in its current setting. To check correct ignition, switch off the burner using the manual switch and have it start again several times. Ignition of the “pilot” flame and that of the main flame must always occur without difficulty and without delay.
- Set gas delivery flow to “minimum” and activate modulation by turning the MIN - 0 - MAX switch to “MAX”. Wait until the disk with the regulation screws has turned approximately 10° (this corresponds more or less to the space occupied by one screw). Then stop modulation by turning the “MIN - 0 - MAX” switch to “0”. In this position, check the flame visually and, if necessary, adjust it. Next, use the appropriate instruments to check combustion and, if necessary, modify the previous setting made after a visual check only. The above operation must be repeated in progressive steps (moving the disk forward approximately 10° at a time) and checking after each move. If necessary, modify the fuel/air ratio over the entire modulation stroke. Gas supply must be controlled throughout the whole operation described above to avoid involuntarily overloading the boiler, which would severely damage it. Therefore, each time the combustion characteristics are checked (CO₂ and O₂), the gas supply must be checked as well. If necessary, modify gas flow to obtain the maximum flow required at the end of the modulation stroke only - use the appropriate adjusting screws. This is necessary to achieve gradual and proper operation of the modulation function. The lowest heat output of natural gas is about 8550 kcal/m³ on average.
- With the burner operating at maximum flow, make sure that smoke temperature does not exceed the maximum permissible level indicated by the boiler manufacturer.
- Now screw in the small screws to the adjustable screws and lock them with the safety nuts to prevent their accidental loosening. Upon finishing this operation, carry out a new check, at least a visual check, of the flame in its different modulation positions, i.e. both while “increasing” (MAX symbol) and while “decreasing” (MIN symbol). If necessary, correct and check again the combustion characteristics by using the specific instruments.
- Now check that the automatic modulation mode operates correctly by setting the AUT - MAN switch to “AUT” (automatic). By suitably adjusting the boiler sensor, you should note that gas flow - controlled by the modulation device - is automatically modified to an adequate level. In normal circumstances, you will not have to use the internal adjustment devices of the “RWF...” power regulator. However, the relative instructions are shown in the appropriate chapter.
- Check the efficiency of the safety devices.
 - Photocell with burner on: slide photocell out of its seat and cover it properly to prevent its sensitive element from receiving light. The burner must stop in “shut-down” mode within one second (all gas valves close, motor off, red lamp on). Check if a manual reset is necessary (press the reset key).
 - Limit device:
 - Thermostat - pressure switch - level switch- flow switch and any other devices. Make sure that activating each device causes the burner to shut down. In addition, check whether the devices require manual resetting, if limit device features

this function.

- Air pressure switch:
 - is designed to prevent burner ignition if air pressure in combustion head is not at the expected value. The pressure switch must therefore be set to close the contact (designed to close during operation) when there is sufficient air pressure in the combustion head. It is clear that this pressure switch must be regulated exclusively during the first stage of burner pre-ventilation. The pressure switch connection circuit is self controlling. This means that the contact designed to close at rest (i.e. when the fan is off and no pressure at the burner head) must effectively be closed. If not, the control equipment will not start. If the contact designed to close when the unit is operating does not close, the unit performs its cycle but the ignition transformer does not start and the pilot gas valves do not open, hence the burner remains in “shut-down” mode.
- The minimum gas pressure switches (and the maximum, if necessary) prevent the burner from operating when gas pressure is not between the expected range. Specific operation of the pressure switches clearly indicates that the minimum pressure switch uses a contact which is normally closed when the detected pressure is higher than its set point. The maximum pressure switch uses a contact which is normally closed when the pressure is lower than its set point. Hence, both the minimum and maximum pressure switches must be regulated when the burner is switched on as this setting depends on the pressure of individual systems. Make sure that the gas pressure switch operates (tripping to open the circuit) to prevent the burner functioning.

BURNER USE

The burner operates fully automatically, so it is not necessary to carry out any kind of adjustment during its operation. The lock-out condition is a safety position to which the burner automatically places itself when any burner part or system part is not working correctly. It is then necessary to ascertain, before resetting it, whether the cause is something that could endanger it.

The unit can also be locked out for temporary irregularities and in this case the burner should function normally if reset. On the other hand, if the unit keeps cutting out (3-4 times in a row), do not continue but seek the assistance of a Service Engineer to locate and repair the problem.

The burner can remain in the shut-down position indefinitely.

MAINTENANCE (GAS BURNER)

If the burner is installed in a suitable place and appropriate fuel is used, frequent maintenance is not necessary. You should, of course, clean the gas filter, combustion head, disk and electrodes regularly. To clean the combustion head, it first needs to be dismantled. Care should be taken during reassembly to centre the combustion head exactly and check the correct position of electrodes and disk. The frequency of these operations can only be established by use since it mainly depends on the fuel and type of system (duty cycle). We recommend carrying out initial checks on a weekly basis and then scheduling as required. We also recommend, though it is outside

INSTRUCTIONS FOR SOLENOID VALVE ON BRAHMA GAS BURNERS MOD. E6G.SR 8

The solenoid valves in this series comply with EN 161, have the EC-type certification (EC Reg. No. 63AQ0626) in compliance with the European Directives 90/396 and 93/68.

The E6G*s are powered with alternating current but have a circuit rectifier integrated solenoid, so the coil is supplied by direct current. Each valve is fitted with an upstream filter to prevent the infiltration of solid particles with diameter >1mm.

Maximum guaranteed operating pressure: 1000 mbar

Class A

Operating temperature: -10 / + 60° C

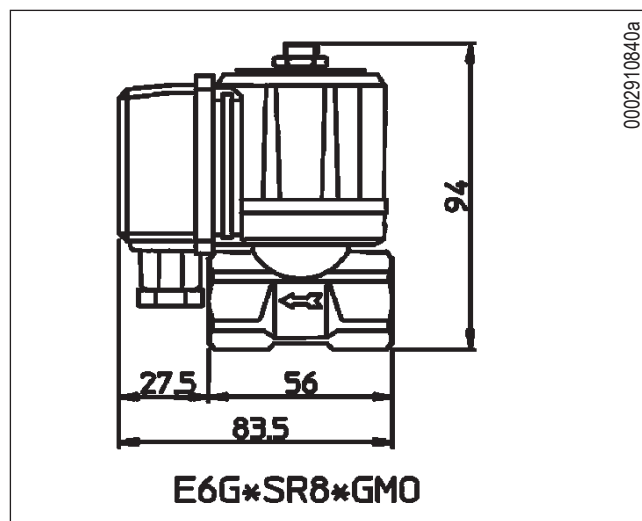
Stainless steel spring

Supply voltage 230 V 50/60 Hz

Coil coating: PA6

Protection rating IP 54 / IP 65

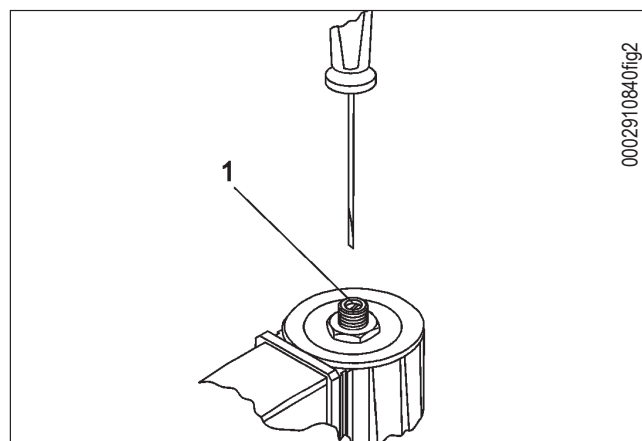
Assembly position: vertical / horizontal



INSTRUCTIONS FOR SETTING SOLENOID VALVE MOD E6G*SR..

Flow rate adjustment:

Turn screw marked 1 clockwise as shown in Fig.2 to reduce the flow, in the opposite direction to increase it.



INSTRUCTIONS FOR SETTING SIEMENS SKP 15.000 E2 GAS VALVE

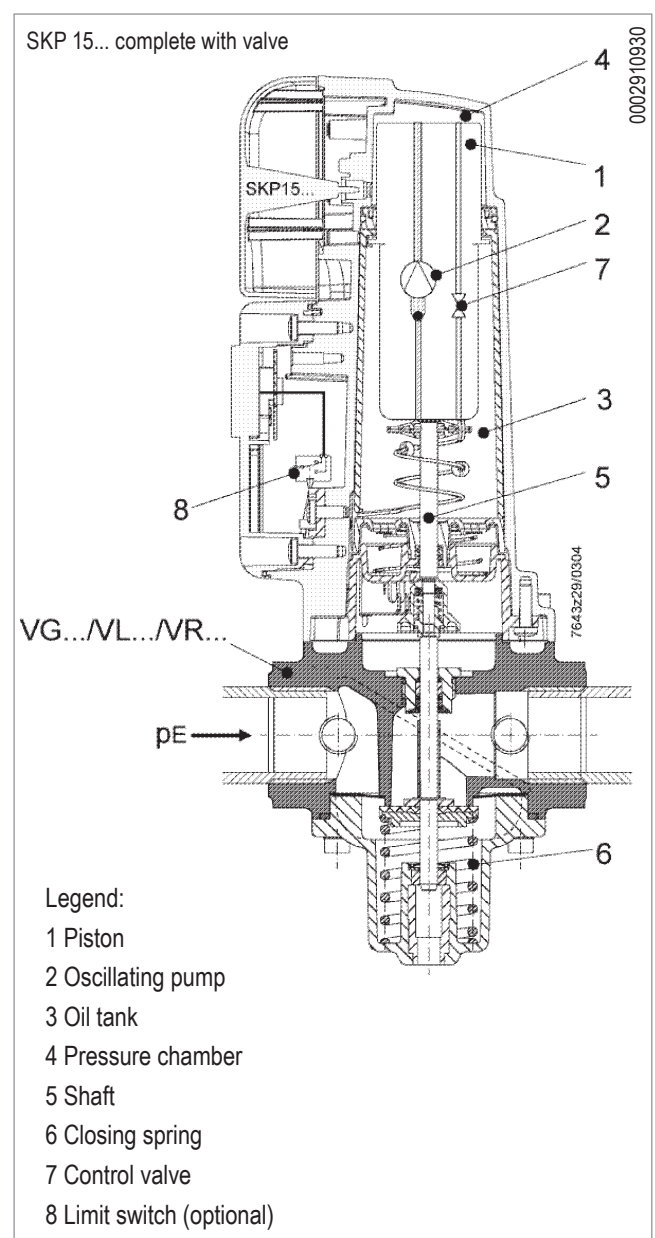
OPERATION

Single-stage valves

When the valve receives the signal to open, the pump cuts in and the magnetic valve closes. The pump transfers the volume of oil under the piston into the upper part of the piston, which moves downward and compresses the spring closure through the stem and plate; the valve remains in the open position and the pump and magnetic valve are powered.

In case of a closure signal (or in the absence of power), the pump stops, the magnetic valve opens to permit decompression of the upper piston chamber. The plate is pushed to the closed position by the combined force of the return action spring and the gas pressure. Closure is complete in less than 0.6 seconds.

This type of valve cannot regulate the gas flow rate (closure/opening).



INSTRUCTIONS FOR SETTING SKP 25.003 E2 WITH PRESSURE REGULATOR

EXECUTION

Servomotor

The hydraulic control system consists of a cylinder full of oil and a pump with oscillating piston. There is also a solenoid valve between the aspiration chamber and the pump thrust chamber, for closure. The piston moves on a sealed joint in a cylinder that at the same time hydraulically separates the suction chamber from the delivery chamber. The piston transmits the movement of the stroke directly to the valve. A red scale that is visible through a transparent slit in the body of the servo motor indicates valve stroke.

Pressure regulator

The pressure regulator is composed of a membrane (an additional safety membrane is provided), of a calibrating spring at a specified value and of an oscillating system for operating a ball valve located on the by-pass between the intake and the delivery chambers of the hydraulic system (see also description at "Operation" description). Regulation field: 0...22 mbar or (after spring replacement) up to 250 mbar. The set value adjustment can be placed under seal. Connection to Rp 1/4 gas measurement point. The maximum inlet pressure depends on the valve diameter.

- The maximum inlet pressure for 3/4" and 1" diameters is 1200 mbar.
- The maximum inlet pressure for 1 1/1" and 2" diameters is 600 mbar.
- The maximum inlet pressure for 65/4" and 80" diameters is 700 mbar.

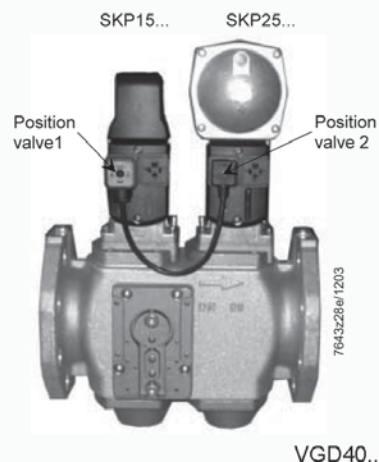
Where there is seal control a depression of up to 200 mbar can be withstood. The body of the servo motor and of the pressure regulator are made of die-cast aluminium.

Operation of valve with pressure regulator

Using the valve with pressure regulator, the valve's outlet pressure acts as a comparative value on a membrane assisted by a spring. The resistance of the spring can be adjusted and is the "prescribed value" (set pressure value). The membrane acts by means of an oscillating system on a by-pass ball valve between the upper chamber and the servo control. If the comparative value is lower than the prescribed value, the by-pass is then closed so that the servo control can open the gas valve. If instead the comparison value is higher than the required value, the by-pass is opened so that the oil can be returned to the lower chamber; the gas valve closes progressively until the required value and the comparison value of the gas pressure coincide. In this state of balance, the by-pass is open so that its flow capacity is equal to that of the pump. In this way the regulator acts as a proportional regulator over a very narrow band. The adjustment is nevertheless stable since the speed of stroke variations is limited. Removing the screwed plug gives access to screw "A" which adjusts the pressure.

To increase the pressure tighten the screw;
to reduce the pressure, loosen it.

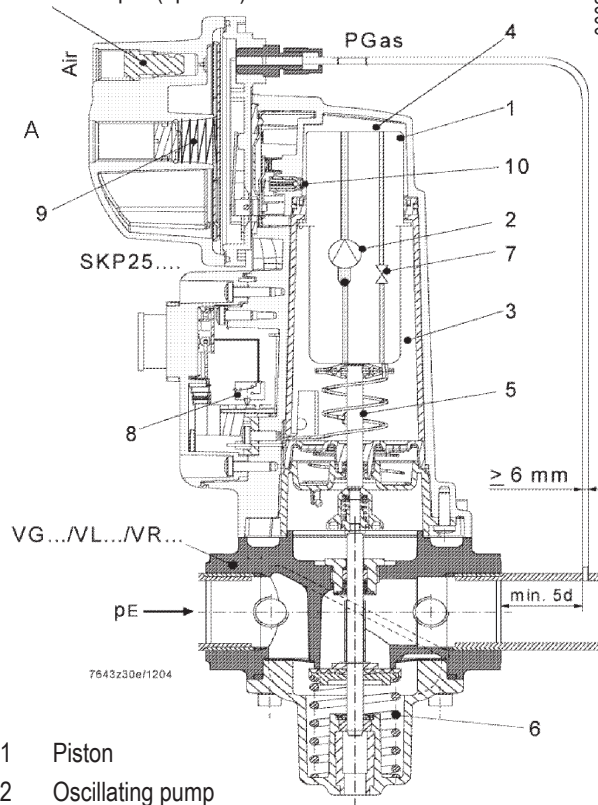
SKP 15.../ 25... with AGA62.000A000 connector



0002910940b

SKP 25... complete with valve

AGA 25 damper (optional)



0002910940a

- | | | | |
|---|------------------|----|--------------------------------|
| 1 | Piston | 8 | Stroke limit switch (optional) |
| 2 | Oscillating pump | 9 | Adjusting spring |
| 3 | Oil tank | 10 | Ball valve |
| 4 | Pressure chamber | | |
| 5 | Shaft | | |
| 6 | Closing spring | | |
| 7 | Operating valve | | |

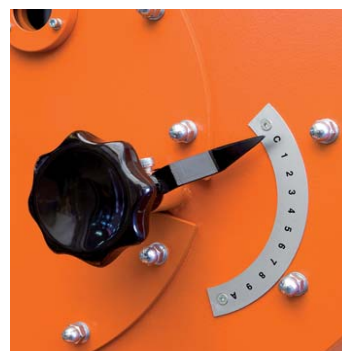
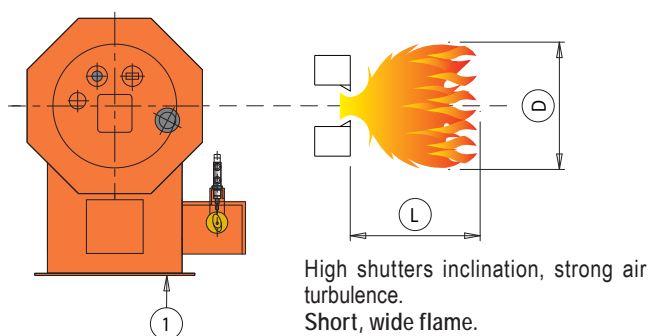
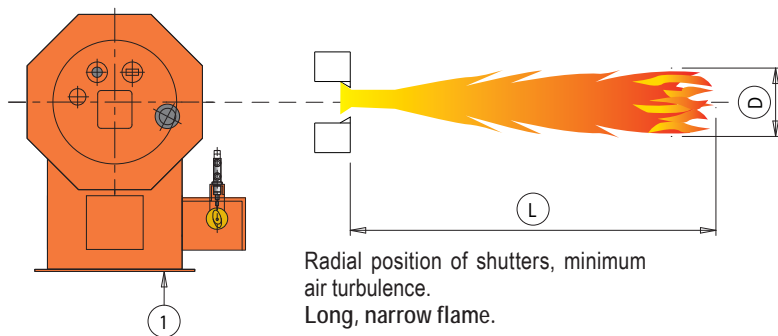
MOD.	P GAS (at the outlet) mbar	spring colour
--	0...22	METAL
AGA22	15...120	YELLOW
AGA23	100...250	RED

BLOCK DIAGRAM OF COMBUSTION AIR REGISTER SHUTTERS POSITIONING

The burner is equipped with an air adjustment knob on the combustion head, which serves to modify, within broad limits, the shape of the flame (diameter-length) to adapt it to the furnace geometry.

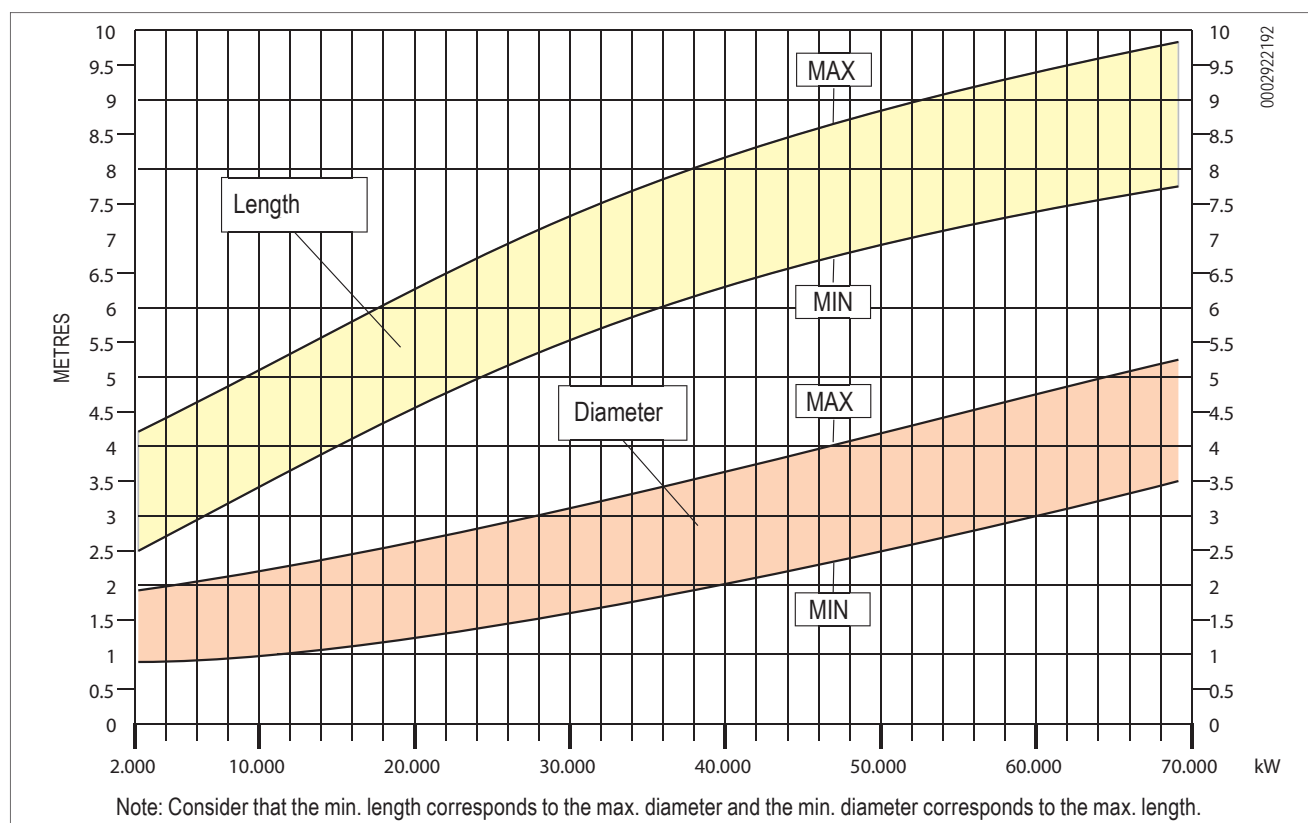
Legend

- 1 Air inlet
- L Flame length
- D Flame diameter



Special flame register knob for regulating flame geometry.

SIZE OF FLAME WITH EXCESS AIR - 5% AND COMBURENT AIR AT 20° C (MIN. AND MAX. INDICATIVE DIMENSIONS)

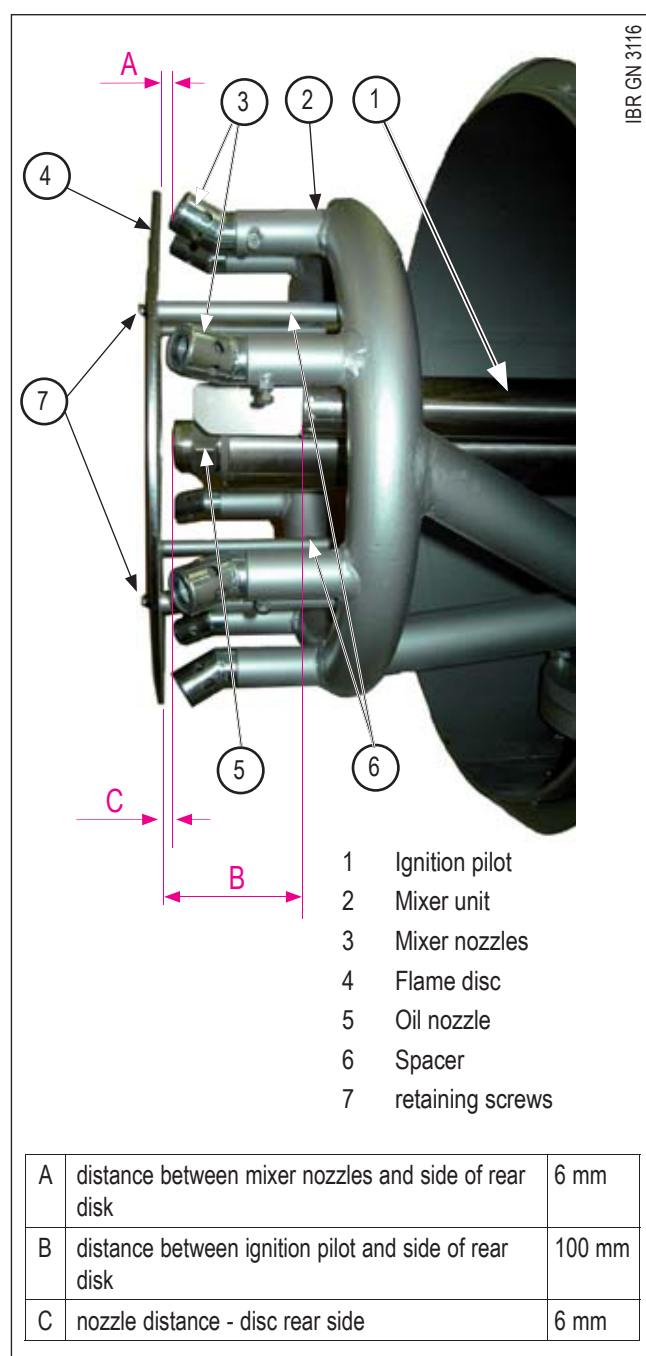


GBP 40 (GAS) PILOT BURNER FLAME DISC LAYOUT

The particular mixing unit with the relative gas adjustable nozzles makes it possible to optimize the air-gas mixture depending on the type of boiler.

In case of flickering or instability of the flame we suggest turning some or all of the nozzles toward the inside of the flame disk.

In any case, after adjusting the combustion and minimum load power, check that the turbulence is compatible with the application. Make sure there is no persistence of flame behind the flame disk. If necessary, open the swirl adjustment or enhance the exhaust of the gas outward by turning the mixer nozzles appropriately.



AIR FLOW RATE AND GAS FLOW RATE ADJUSTMENT WITH SERVO-MOTOR

1) GENERAL INFORMATION

- combustion air and fuel can be adjusted to the ratio desired using the special device.
- The field of adjustment is limited by electric micro limit switches, coupled to adjustable cams inside the servomotor.

2) MODULATION UNIT COMPONENTS (0002932530)

The air/gas regulator is composed of three main parts:

- 2.1 Modulation servo-motor.
- 2.2 Air shutter regulating drum.
- 2.3 Gas flow rate regulating drum.

2.1) MODULATION SERVOMOTOR (8562/2)

Control through synchronous motor. The limit stroke microswitches are housed inside of it. The time taken by the servomotor from the minimum to the maximum position is 66 seconds. The stroke angle of the servomotor can be adjusted easily by adjusting the graduated cams manually. Internally there is a motor coupling connection and disconnection lever - a camshaft enabling manual rotation of the regulating drum with the eccentric disc cam.

2.2) GAS AND AIR SHUTTER REGULATING DRUM WITH LEVER DRIVEN MECHANICAL TRANSMISSION (0002932530)

The regulating drum is fitted with adjusting screws. Two feelers are resting on the two profiles generated on adjusting the drum screws. Drum rotation causes the feelers to move and, by means of two transmission levers, they move the air and gas shutters.

3) COMMISSIONING THE REGULATOR

Prior to adjustment of the regulating drum, make sure the electrical system is functioning correctly.

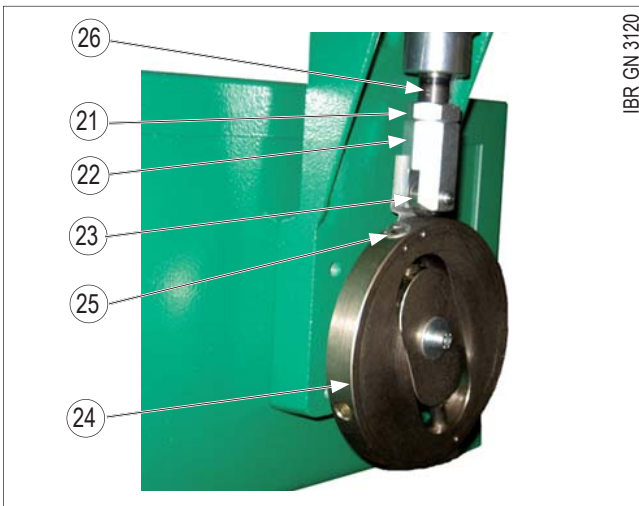
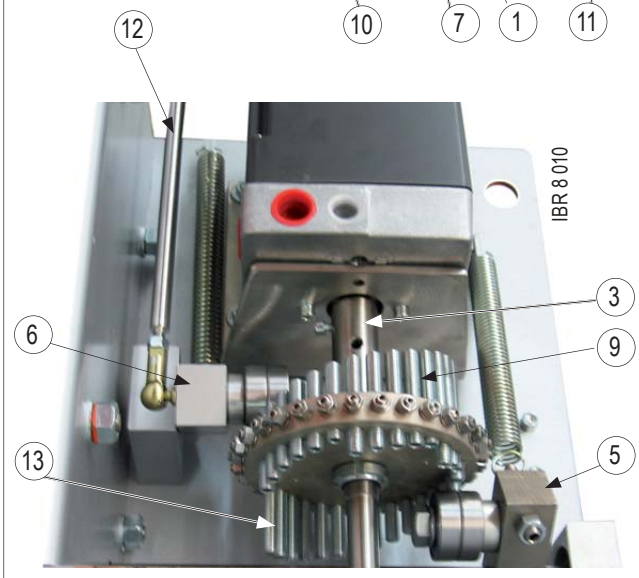
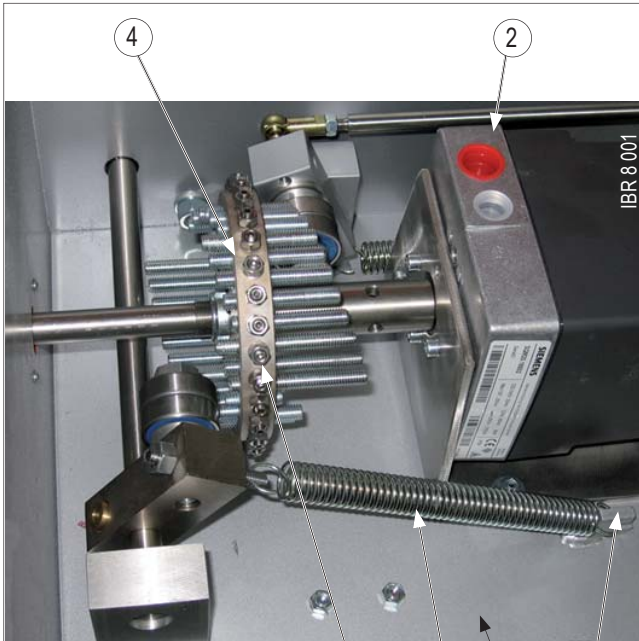
3.1) COMBURENT AIR REGULATION (0002932530)

The regulating drum is set by the manufacturer so that the air blades are fully open when the modulation servomotor is in its maximum position. In general, the combustion air fan is set to a higher flow than necessary to ensure optimum combustion. Therefore, when the shutters are fully open, the quantity of combustion air is excessive. The exact setting for the air flow is made by turning the screws (13), after first releasing the release nut and screw (10). The modulation servomotor must be moved gradually starting from the minimum position and passing from screw to screw to adjust the air in every point of the regulation arc.

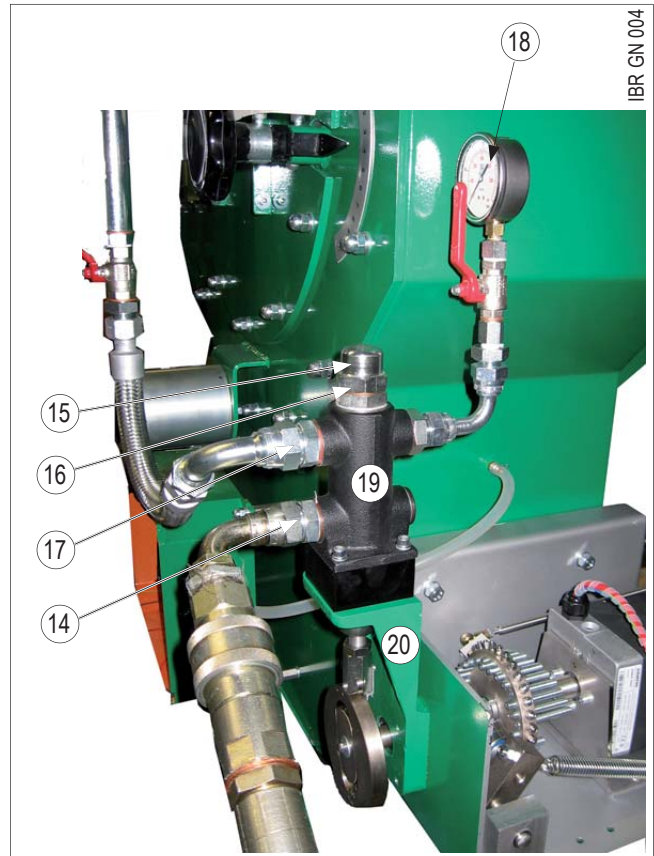
3.2) NATURAL GAS FLOW RATE REGULATION

The regulation drum, with the other set of screws (9) with micrometric adjustment, acts on the bearing feeler that transforms the movement caused by the screws on a linear control, so as to drive the gas flow adjustment butterfly valve. For the adjustment, see item 3.1. above.

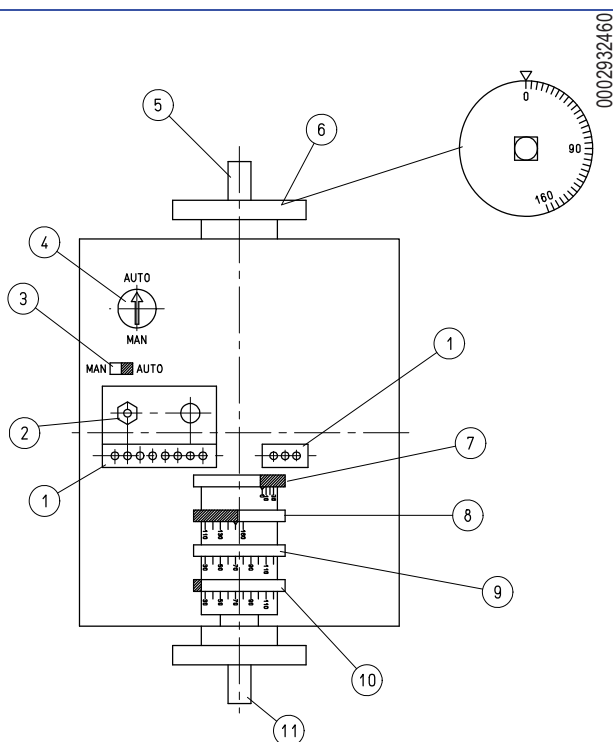
COMBURENT AIR-FUEL OIL FLOW ADJUSTMENT UNIT



- 1 SUPPORTING FRAMEWORK
- 2 MODULATING MOTOR
- 3 PIN
- 4 DRUM WITH AIR-GAS REGULATION SCREWS
- 5 AIR SHUTTER CONTROL LEVER
- 6 GAS THROTTLE CONTROL LEVER
- 7 SPRING
- 9 GAS REGULATION SCREW
- 10 SCREWS AND LOCKNUTS FOR BLOCKING ADJUSTMENT SCREWS
- 11 SPRING ANCHOR
- 12 GAS THROTTLE CONTROL ROD
- 13 AIR REGULATION SCREW
- 14 FUEL RETURN TO SYSTEM
- 15 ADJUSTING SCREW PLUG
- 16 ADJUSTING SCREW (INTERNALLY)
- 17 FUEL RETURN FROM NOZZLE
- 18 PRESSURE GAUGE
- 19 FLOW RATE REGULATION VALVE BODY
- 20 VALVE SUPPORT
- 21 BEARING SUPPORT LOCKNUT
- 22 BEARING SUPPORT
- 23 CONTACT BEARING
- 24 FLOW RATE VARIATION CAM
- 25 CAM ECCENTRICITY SETTING SCREW
- 26 SLIDING PIN



SPECIAL MDL 24 MOTOR FOR CONTROLLING MODULATION OF CAM SETTING



- 1 - Terminal box
- 2 - SW7 baffle for servomotor rotation control either clockwise or counterclockwise, operating only with 1 cm in MAN position
- 3 - Cm 1 switch for automatic or manual electrical operation
- 4 - Drive shaft reset device (180° rotation)
- 5 - Drive shaft for modulation coil coupling
- 6 - Reference index
- 7 - Servomotor minimum opening adjustment cam - 0° (red)
- 8 - Servomotor maximum opening adjustment cam - 130° (yellow)
- 9 - Auxiliary cam, unused (blue)
- 10 - Auxiliary cam to enable burner to start only with modulation at minimum delivery (blue) 20°
- 11 - Drive shaft with 10 mm wrench seating to allow for manual rotation when the drive shaft reset device is in MAN position

LGK 1... GAS BURNER COMMAND AND CONTROL EQUIPMENT

Command and control equipment for mid and large output blown-air burners (intermittent service *) for 1 or 2 stage burners or for modulating burners with air pressure monitoring for air shutter control. This command and control equipment bears the EC mark, in accordance with the Gas and Electromagnetic Compatibility Directive.

* For safety reasons, it is important to perform a controlled stop each 24 hours!

As regards the standards

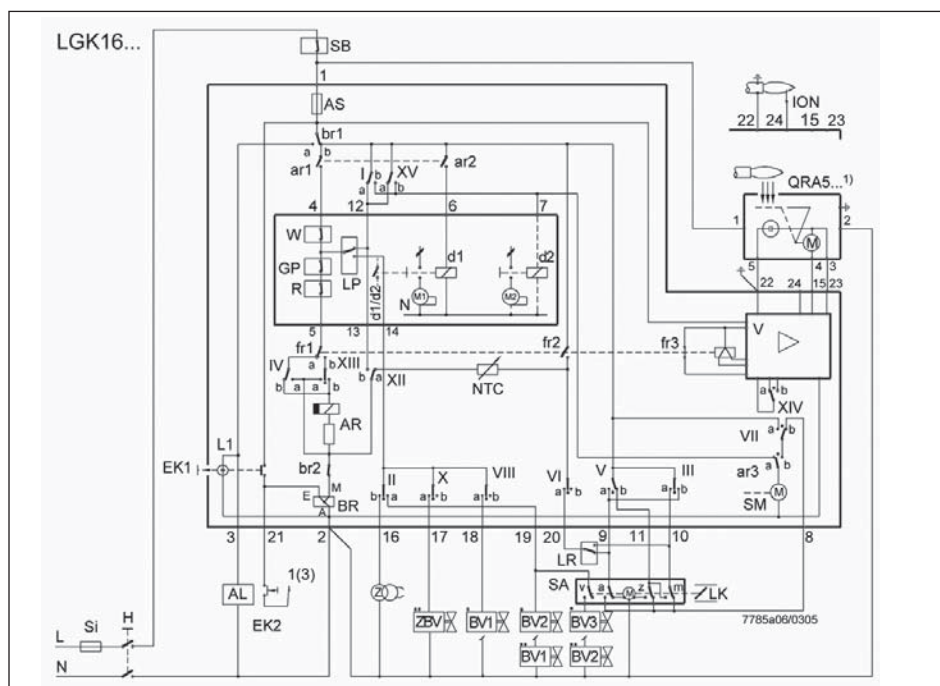
The following LGK 1... are above the standards and offer therefore extra high safety:

- The flame detector test and false flame test start immediately after the tolerated post-combustion time. If the valves remain open, or do not close completely after adjustment stops, a shut-down stop is triggered at the end of the tolerated post-combustion period. The tests will end only at the end of the pre-ventilation time of the next start-up.
- The validity of operation of the flame control circuit is checked every time the burner starts up.
- The fuel valve control contacts are checked for wear during the post-ventilation time.
- A built-in fuse in the appliance protects the control contacts from any overloads that may occur.

As regards the burner control

- The equipment allows operation with or without post-ventilation.
- Air shutter controlled command to ensure pre-ventilation at nominal air flow. Controlled positions: CLOSED or MIN (position of ignition flame on start-up); OPEN at the beginning and MIN at the end of the pre-ventilation time. If the servomotor does not position the air shutter at the points described, the burner does not start-up.
- Ionization current minimum value = 6mA
- UV cell current minimum value = 70mA
- Phase and neutral must not be inverted.
- Any assembly position and place (IP40 protection)

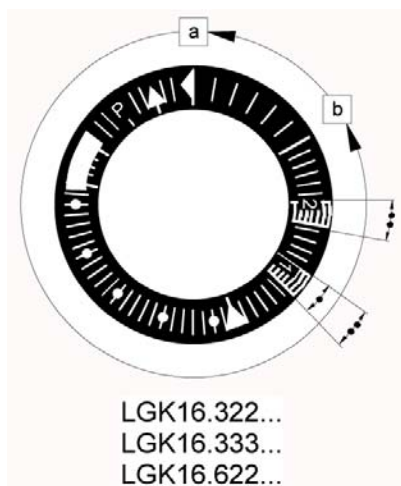
CONNECTION DIAGRAMS



Caution! Do not press lockout reset button «EK...» for more than 10 seconds!

1) When used in connection with QRA53... / QRA55..., earthing of terminal 22 is mandatory!

CONTROL SEQUENCE IN THE EVENT OF FAULT AND INDICATION OF LOCKOUT (CONT'D)



Lockout indication

a-b Startup sequence

b-b' With certain time variants: «Idle steps» of the sequence switch up to the self-shutdown after burner startup (b' = operating position of the sequence switch)

b(b')-a Postpurge sequence after controlled shutdown. In start position «a», the sequence switch switches itself automatically off or immediately initiates another burner startup (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 lockout has occurred, the burner control can immediately be reset. After reset-ting, and also after correction of a fault, which resulted in shutdown, or after a mains failure, the sequence switch always runs to its start position, whereby only terminals 7, 9, 10 and 11 receive power in accordance with the control sequence. It is only then that the burner control programs a burner restart.



Note! Do not press the lockout reset button for more than 10 seconds.

LEGEND

a	Changeover end switch for air damper's fully open position	EK...	Lockout reset button
m	Auxiliary changeover switch for the air damper's MIN position	SM	Synchronous motor of sequence switch
AL	Remote lockout warning device (alarm)	ION	Ionization probe
AR	Main relay (load relay) with «ar» contacts	v	In the actuator: Auxiliary changeover switch for release of fuel as a function of the air damper position
M...	Fan or burner motor	FR	Flame relay with «fr» contacts
AS	Unit fuse	FS	Flame signal
NTC	Resistor with negative temperature coefficient	GP	Gas pressure switch
B	Wire link (on the burner control's base)	V	Flame signal amplifier
QRA...	UV detector	H	Mains isolator
BR	Lockout relay with «br» contacts	W	Limit thermostat or pressure switch
R	Control thermostat or pressurestat	L...	Lockout warning lamp
BV...	Fuel valve	z	In the actuator: End switch for the air damper's fully closed position
RAR9...	Silicon photocell detector	LK	Air damper
bv...	Auxiliary contact in the valve actuator for the fully closed position check	LP	Air pressure switch
SA	Actuator of air damper	Z	Ignition transformer
SB	Safety limit thermostat	LR	Load controller
d...	Contact or relay	ZBV	Pilot valve
Si	External fuse		

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

- A Startup
- B Operating position
- C Controlled shutdown
- D End of control sequence

Control signals delivered by the burner control

Permissible input signals

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 will interrupt the startup sequence or initiate lockout

Lockout indication positions when there is no input signal (refer to «Control sequence in the event of faults»):

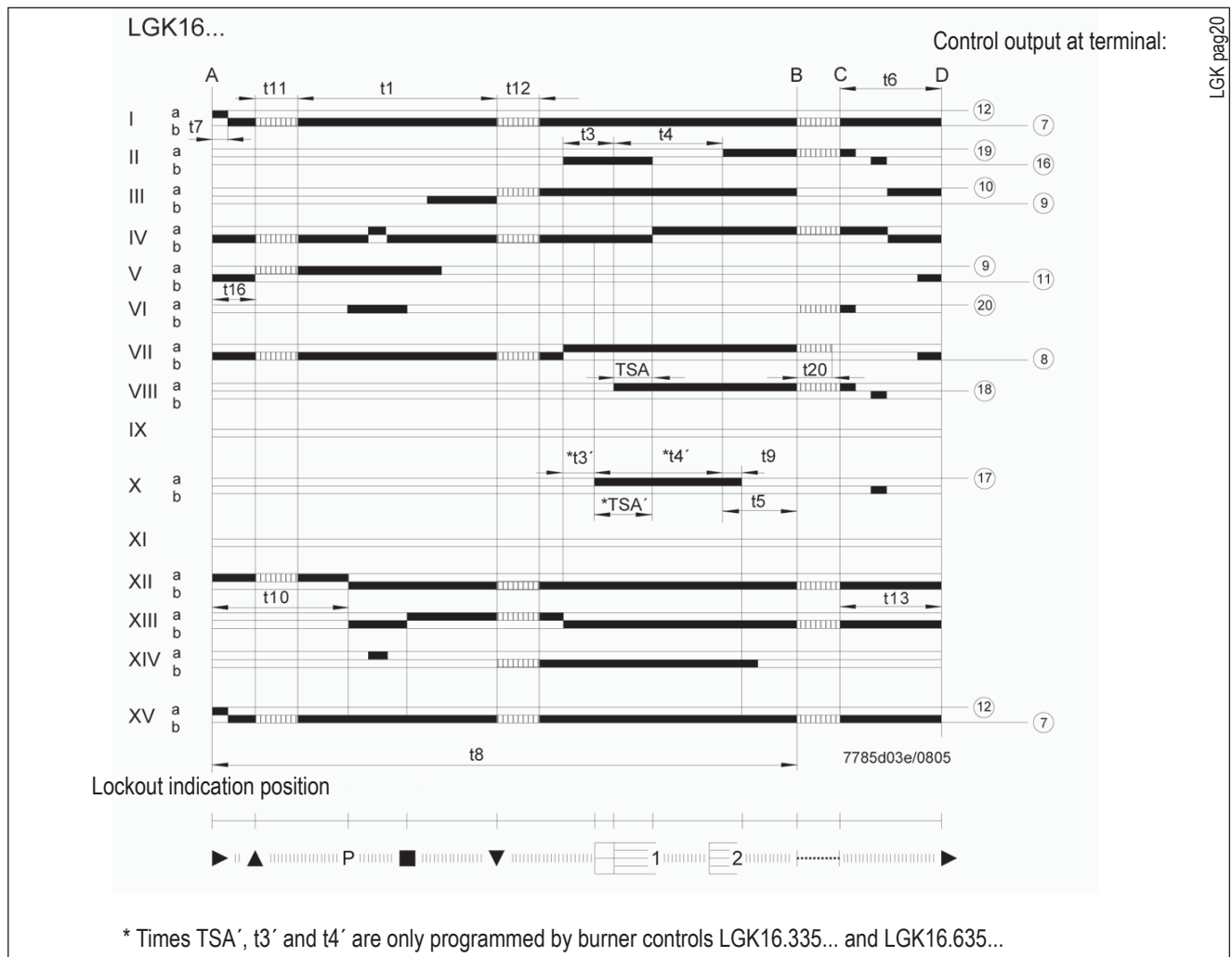
- | | | | |
|---|--|---|---------------------------|
| ◀ | No start | 1 | Lockout (no flame) |
| ▲ | Abortion of startup sequence | 2 | Lockout (no flame) |
| ▼ | Abortion of startup sequence | P | Lockout (no air pressure) |
| ■ | Lockout (fault in the flame supervision circuit) | | |

Time table

t1	Prepurge time with air damper fully open	t12	Running time of air damper into the low-fire position
t7	Switch-on delay for fan motor M2	t4	Interval between the start of «TSA» or «TSA'» to the valve connected to terminal 19
TSA	Safety time or first safety time with burners using a pilot	t13	Permissible afterburn time
t8	Duration of startup sequence excluding «t11» and burner «t12»	t16	Interval from the start to the OPEN command for the air damper
TSA'	Safety time or first safety time with burners using a pilot burner	t4'	Interval from the start of «TSA» or «TSA'» to the release of the valve connected to terminal 19
t9	Second safety time with burners using a pilot burner	t20	Interval to the self-shutdown of the sequence switch
t10	Interval from the start to the beginning of the air pressure check	max.	Safety time in the event of loss of flame during operation
t3	Preignition time	t5	Interval from the end of «t4» or «t4'» to the release of the load controller or valve at terminal 20
t3'	Preignition time	t6	Postpurge time (identical with the permissible afterburn time <t13>)
t11	Running time of air damper into the fully open position		
t3n	Postignition time (ignition transformer connected to terminal 15)		

* Times TSA', t3' and t4' are only programmed by burner controls LGK16.335... and LGK16.635..

Program sequence



LDU 11.. GAS VALVE SEAL CONTROL EQUIPMENT

USE

LDU 11 equipment is used to verify the seal of the valves on natural gas burners. The LDU 11, combined with a normal pressure switch automatically verifies seal of natural gas burners valves before every start up and immediately after each stop. Seal control is carried out by two-stage verification of gas circuit pressure in the section between the two burner valves.

OPERATION

During the first stage of the seal control "TEST 1" the pipeline between the valves being checked must be at atmospheric pressure. In installations lacking a pipeline for depressurization, this condition is achieved by the seal control equipment, which opens the valve on the furnace side for 5 seconds during time "t4". After achieving atmospheric pressure for 5 seconds the valve on the furnace side is closed.

During the first phase (TEST 1) the control equipment ensures that atmospheric pressure in the pipes is kept constant, by means of the pressure switch "DW".

If there is blow-by in the safety valve while closing, pressure increases and as a result the "DW" pressure switch operates. For this reason, in addition to indicating pressure, the equipment goes into fault state and the position indicator stops, locked in the "TEST 1" position (red indicator lit).

Otherwise, if pressure does not increase because there is no blow-by in the safety valve as it closes, the equipment immediately programs the second stage "TEST 2".



Under these conditions, the safety valve opens for 5 seconds during "t3" time and introduces gas pressure into the pipeline ("filling operation"). During the second verification stage, this pressure must remain constant. Should it drop, this means that the burner on the furnace side has a blow-by (fault) when closing. Therefore the "DW" pressure switch operates and the seal control equipment prevents burner start-up and stops in locked state (red indicator lit). If second stage verification is positive, the LDU 11 equipment closes the internal control circuit between terminals 3 and 6 (terminal 3 - contact ar2 - outer cross-connection for terminals 4 and 5 - contact III - terminal 6).

This is the circuit that usually enables the equipment start-up control circuit.

After circuit between terminals 3 and 6 has closed, the LDU 11's programmer returns to rest position and stops. This means it enables fresh verification without changing the position of the programmer's control contacts.

Note Set "DW" pressure switch to a value of about a half of the gas system pressure.

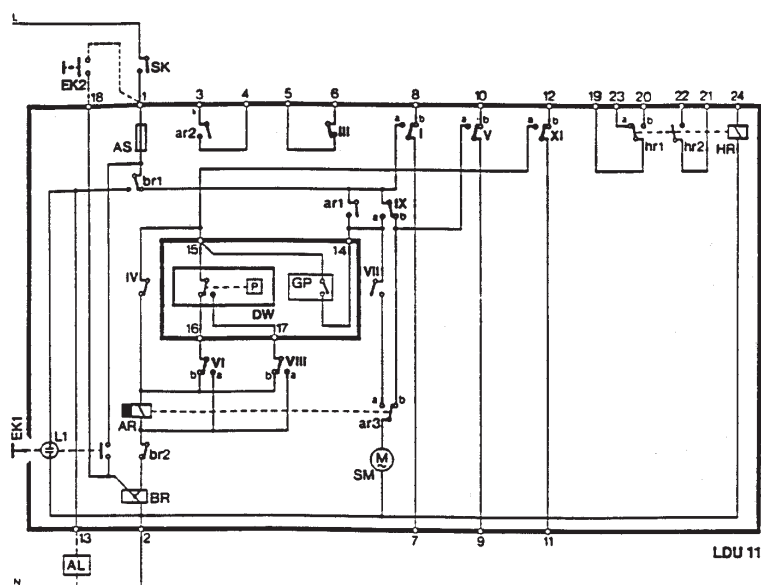
Key to symbols :

}	Ignition = operating position
	Systems not provided with bleeding valve = discharge into the atmosphere of the test circuit through the opening of the burner valve on the furnace side.
TEST 1	"TEST 1 " piping at atmospheric pressure (leakage test upon closing of safety valve).
	Putting under pressure the test circuit gas through the opening of the safety valve.
TEST 2	"TEST 2" piping at gas pressure (leakage test upon closing of safety valve).
III	Automatic programmer return to zero (or to rest position).
}	Operation preset for a new leakage test.

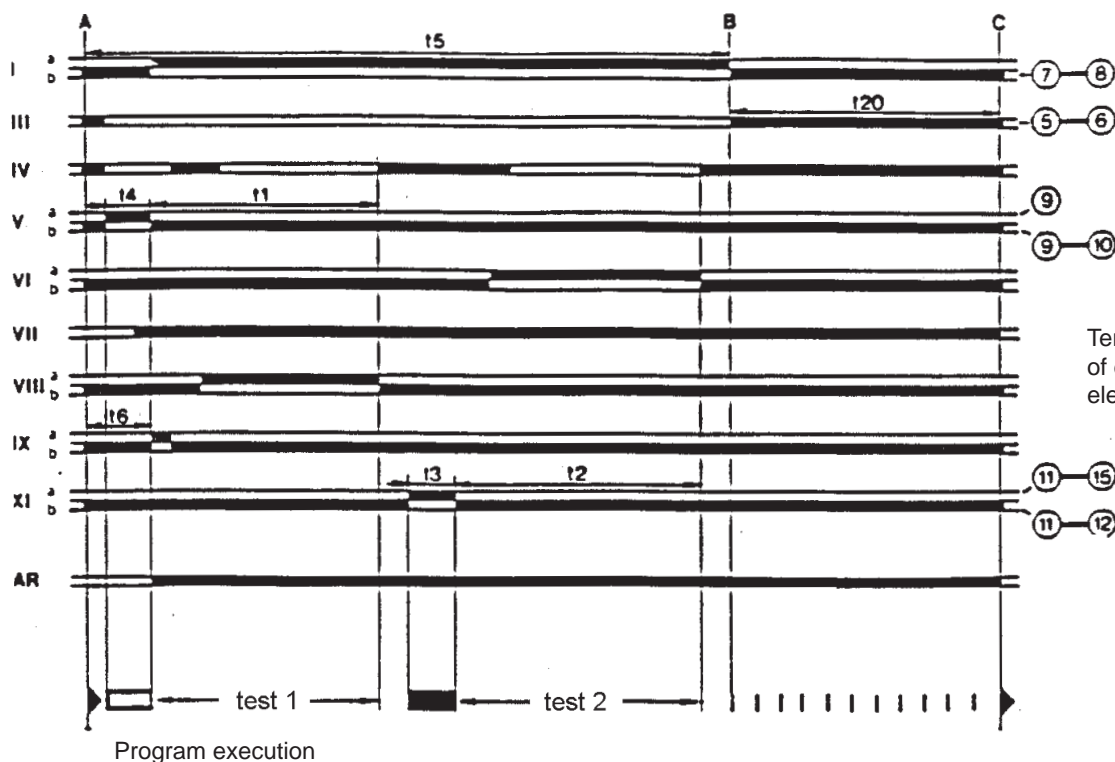
If trouble is signaled, there is no voltage in all control equipment terminals excepting terminals 13 which gives remote, visual indication of trouble. When verification is over, the programmer automatically returns to rest position, and is ready to carry out a further program for checking seal of valves as they close.

Control program

t_4	5s	Putting the circuit to be tested under atmospheric pressure
t_6	7,5s	Time elapsed between the start and the energizing of the main relay "AR"
t_1	22,5s	1° test phase with atmospheric pressure
t_3	5s	Putting the test circuit gas under pressure
t_2	27,5s	2° second test phase with gas pressure
t_5	67,5s	Total leaking test time, till enabling of burner operation
t_{20}	22,5s	Programmer return to rest position = ready for a new test.



- AL remote alarm signal
- AR main relay with the 'ar...' contacts
- AS device fuse
- BR shut-down relay with 'br...' contacts
- DW external pressure switch (leak test)
- EK reset key
- GP external pressure switch (of system gas pressure)
- HR reset relay with 'hr...' contacts
- L1 lamp signalling device faults
- SK line switch
- I... XI programmer cam contact



TROUBLESHOOTING GAS BURNERS

NATURE OF MALFUNCTION	POSSIBLE CAUSE	SOLUTION
<p>The equipment goes into shut-down status with flame on (red indicator lit).</p> <p>The fault is limited to the flame control system or points 3 and 4.</p>	<ul style="list-style-type: none"> Flame sensor (UV cell) interrupted or fouled with smoke Faulty equipment Fouled disc or opening Insufficient draught 	<ul style="list-style-type: none"> Clean or replace Replace the equipment Clean them Check all flue gas passages
<p>Appliance locked out with fuel flowing from combustion head, but no flame (red light lit).</p> <p>The fault refers only to the ignition system, provided that the fuel is in good conditions</p>	<ul style="list-style-type: none"> Interruption of ignition circuit Cables of ignition transformer discharge to ground Cables of ignition transformer not connected properly Ignition transformer is faulty Electrode ends are not at the right distance The electrodes discharge to ground because they are fouled or because the insulation is cracked. Check also under the fastening terminals of the insulating elements "Gas pilot" flame, if any, does not ignite due to incorrect setting of gas flow rate or of Air to gas ratio There may be air in the pipeline, in case of first ignition 	<ul style="list-style-type: none"> Check the entire circuit Replace them Connect them in a correct way Replace it Return to the correct position Clean or replace it as necessary Check and carry out the necessary adjustments Bleed air from the pipes again
<p>. Appliance locked out with fuel flowing from combustion head, but no flame (red light lit)</p>	<ul style="list-style-type: none"> Excess combustion air Improper air/gas ratio in "pilot burner" if any, or improper air/gas ratio in main burner, Air in pipeline, in case of first ignition Adjustment of air turbulence at head excessively closed (approx. position less than 2) 	<ul style="list-style-type: none"> Reduce combustion air Check and adjust air/gas ratio as necessary Bleed air from the pipes again Open the turbulence regulation slightly then set it in the proper position for the specific case.
<p>Device shut-down without fuel flowing from burner (red light lit)</p>	<ul style="list-style-type: none"> Missing phase Inefficient electric motor Motor (3-phase) turning in the wrong direction (check the arrow) Air pressure switch not working due to insufficient pressure Main gas valves not supplied or coil faulty No gas 	<ul style="list-style-type: none"> Check power line Repair or replace Invert a phase in the power switch Adjust pressure switch as necessary or increase air pressure (open intake damper wider or close at head) Make sure power is reaching the terminal board of the gas valves; check coil efficiency and relevant power circuits Make sure the gas filter is clean. Check on a pressure gauge installed at the gas train input, that the pressure is sufficient

NATURE OF MALFUNCTION	POSSIBLE CAUSE	SOLUTION
Burner fails to start	<ul style="list-style-type: none"> Thermostats (boiler or minimum) or pressure switches or level switches actuated Flame sensor (UV photocell) short circuit No power due to main circuit breaker tripped or meter overload cutout tripped or power cut or blown fuses. The thermostat line has not been executed as per layout or a thermostat or level switch has been tripped Equipment internal fault No gas and therefore gas minimum pressure switch will not allow burner to start 	<ul style="list-style-type: none"> Change settings to more suitable level or wait for them to reset Replace it Turn off the switches or wait for the power to be resumed or replace faulty fuses Check connections of thermostats and level switch Replace it Check gas pressure value and if necessary check efficiency of gas filter and pressure regulator. Check the efficiency of gas minimum pressure switch and relative power line
Poor flame, with sparks	<ul style="list-style-type: none"> Excess combustion air or insufficient gas supply 	<ul style="list-style-type: none"> Regulate flow of air and/or gas
Flame not properly shaped with presence of smoke and soot	<ul style="list-style-type: none"> Insufficient combustion air Unsuitable refractory coating (it reduces excessively the space for the flame) Boiler or chimney ducts blocked. 	<ul style="list-style-type: none"> Increase combustion air Modify it, carefully abiding by the instructions given by boiler manufacturer Arrange for cleaning.
Defective flame (flickering or protruding from combustion head)	<ul style="list-style-type: none"> Excessive draught (only in case an extractor fan is present on the chimney) Disc fouled Excess combustion air 	<ul style="list-style-type: none"> Adjust extractor fan speed by changing the diameter of the pulley. Do not "narrow" the section of the chimney with the air shutter Clean it Reduce combustion air
Scale inside boiler and/or presence of condensate in tube nest	<ul style="list-style-type: none"> Too low boiler working temperature (below dew point) Too low flue gas temperature (below 180°C) 	<ul style="list-style-type: none"> Increase operating temperature Request manufacturer's authorization before increasing fuel flow rate
Soot at chimney outlet	<ul style="list-style-type: none"> 1) Severe shortage of combustion air or extreme excess of gas 	<ul style="list-style-type: none"> 1) Regulate flow of combustion air and/or gas
Water in chimney serving gas burner	<ul style="list-style-type: none"> Excessive flue gas cooling (below dew point) due to insufficient chimney insulation or infiltration of cold air 	<ul style="list-style-type: none"> Improve chimney insulation and close any opening that could allow cold air to enter the chimney

ELECTRICAL WIRING DIAGRAM

Customer Desmet Ballestra Spa

Plant SABIZ 8000 kg/h

Job 2F11

Customer ref. FAR EAST MACHINERIES LTD (NIGERIA)

Item 64.H1

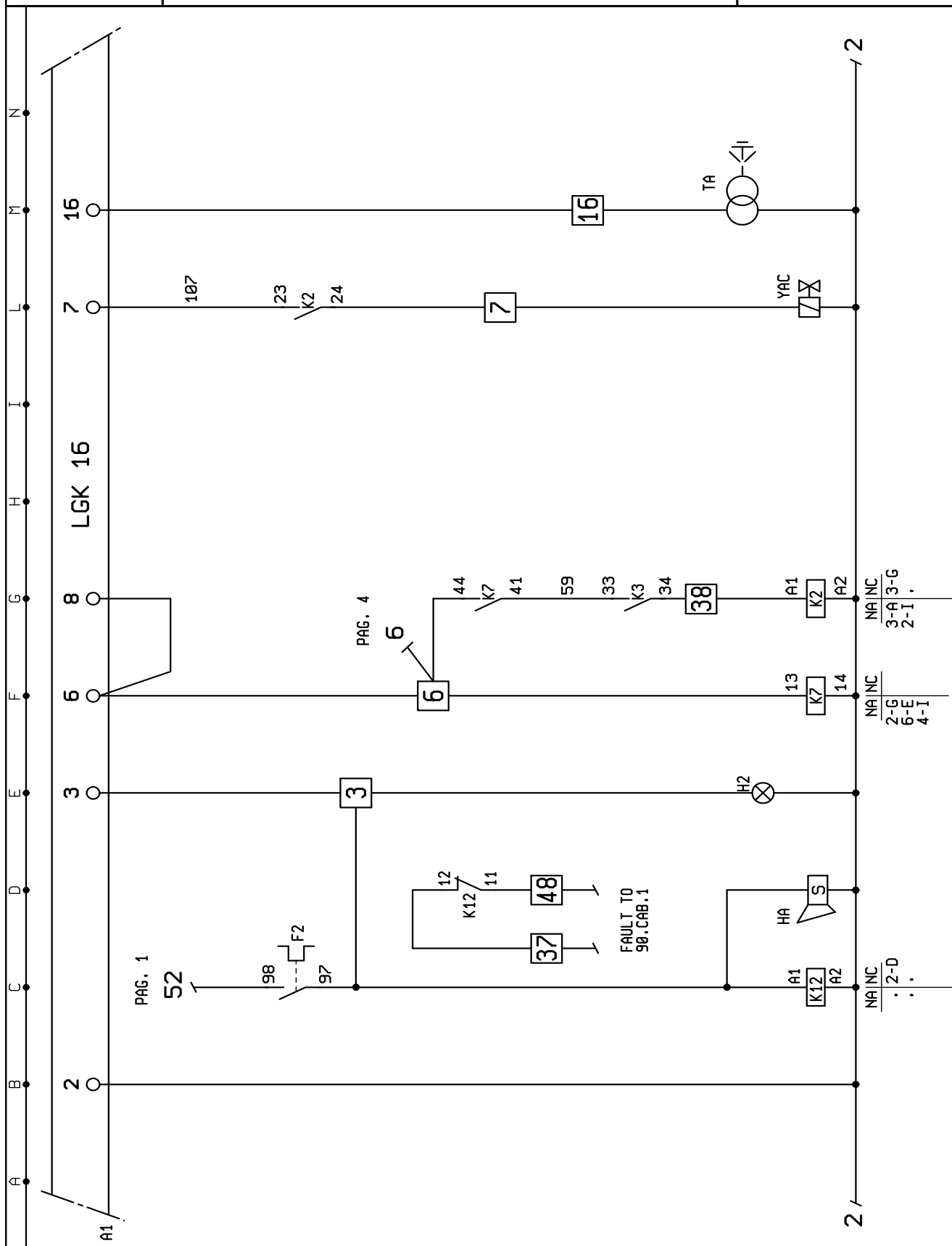
Burner IBR 6 GL (FS21201213)

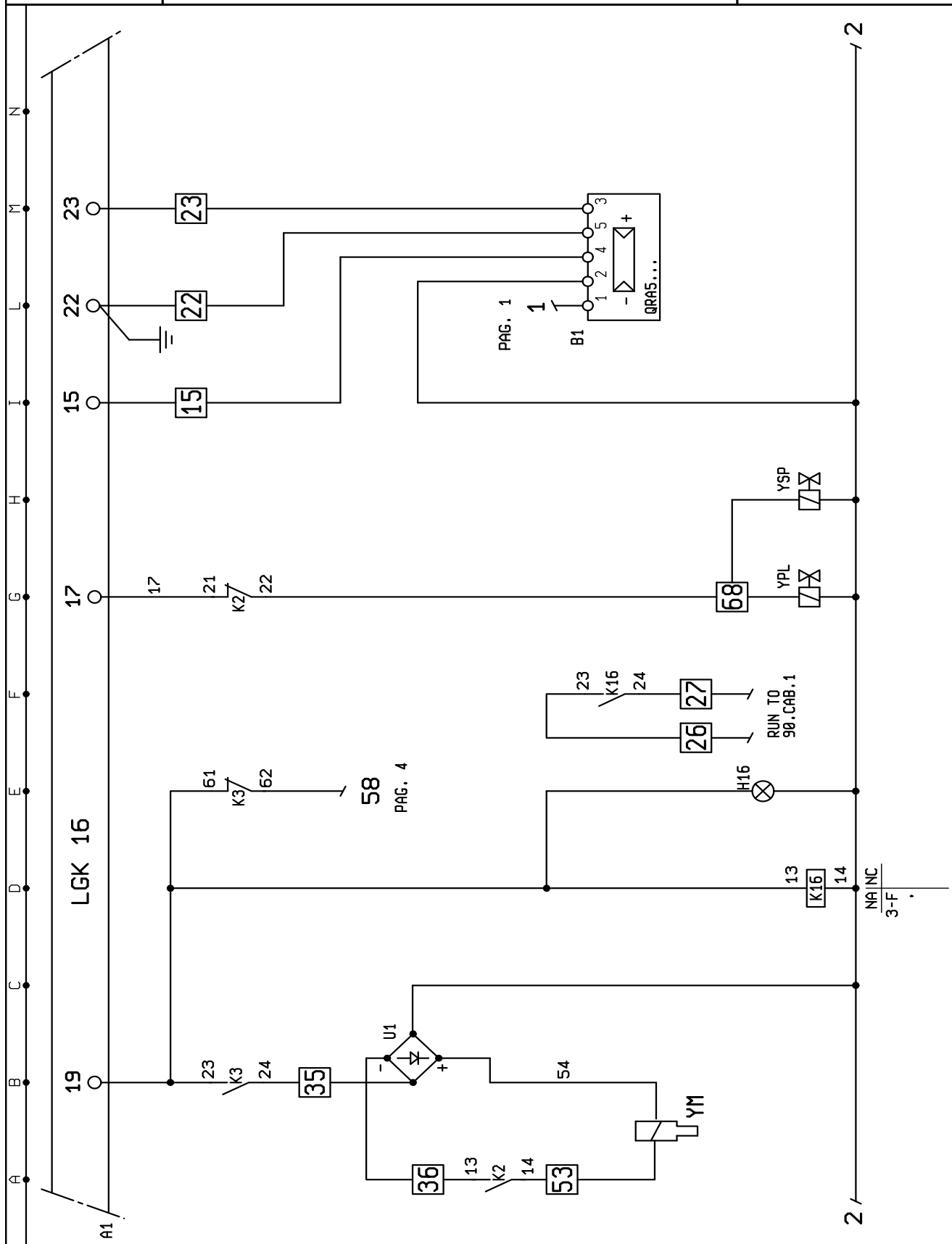
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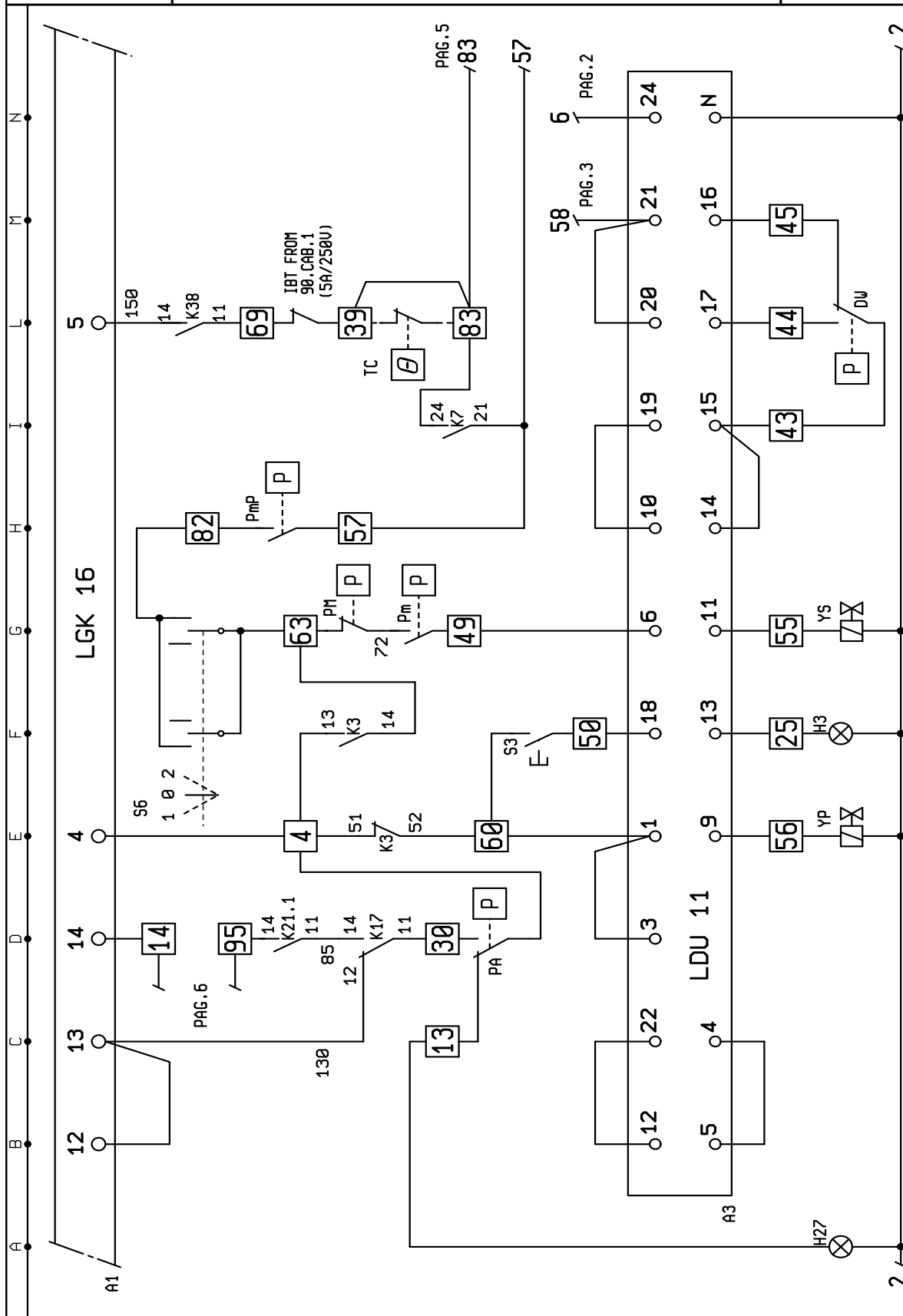
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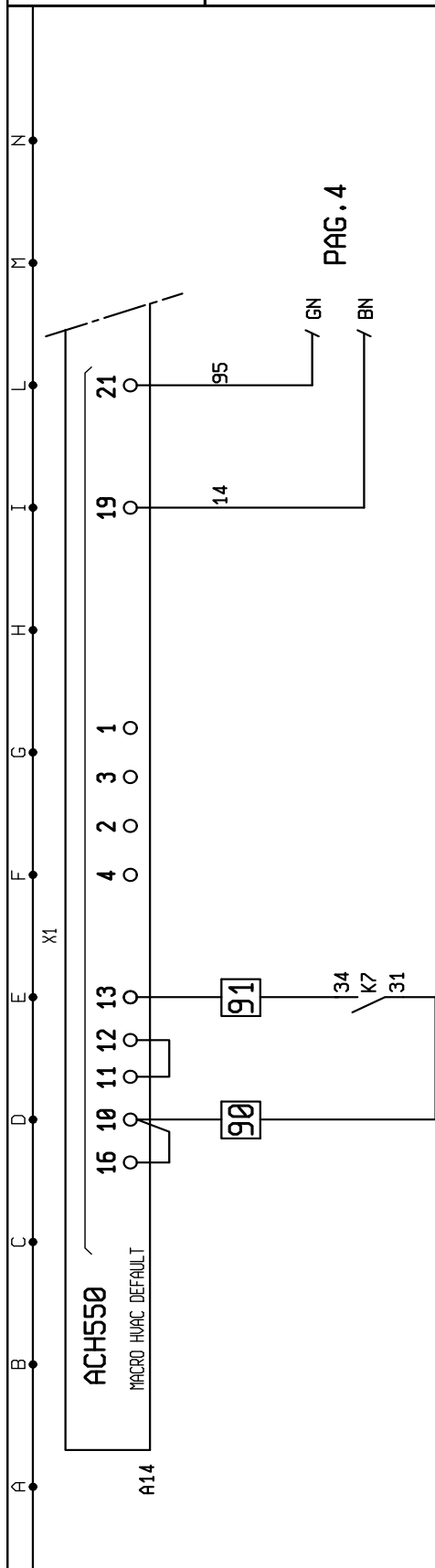
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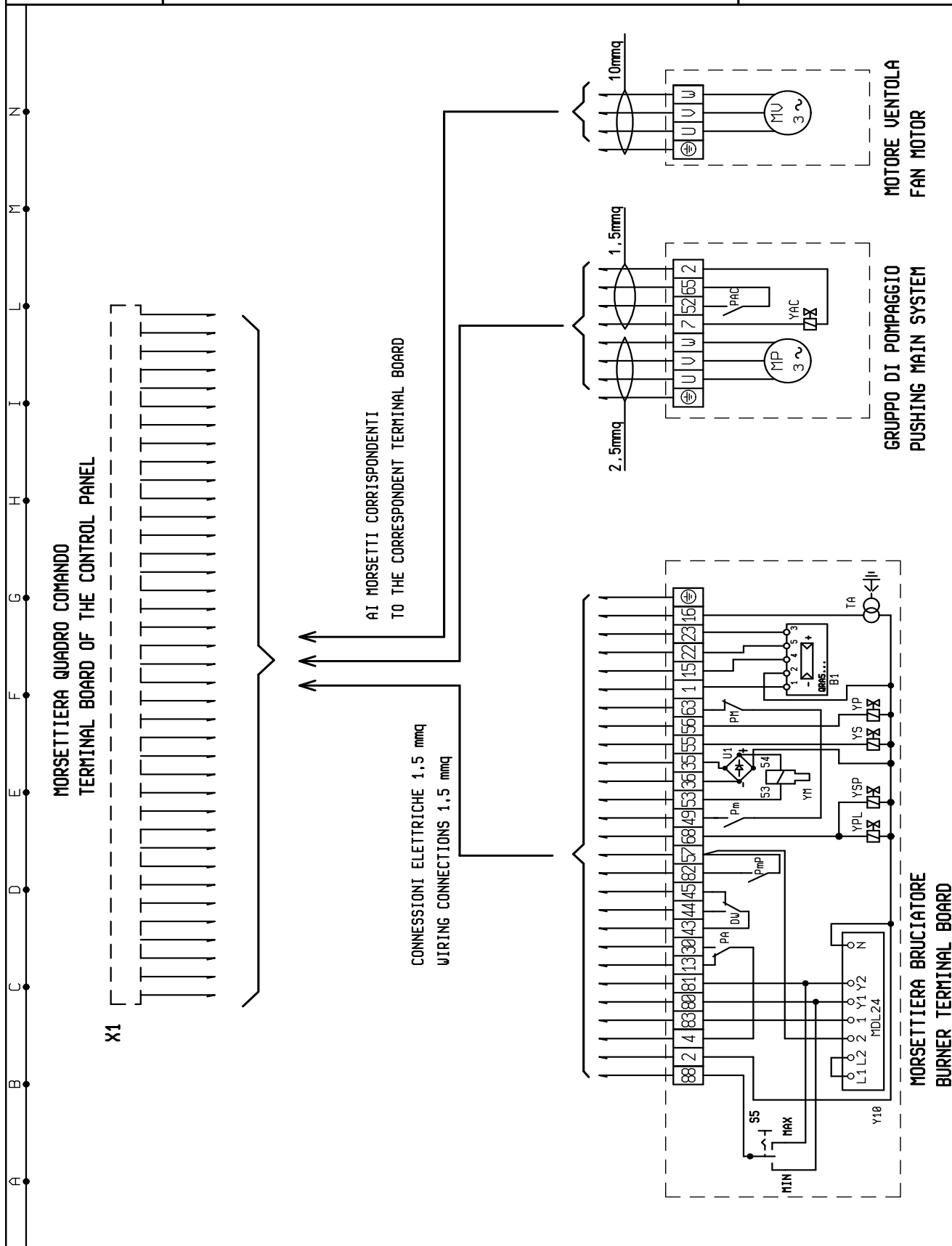
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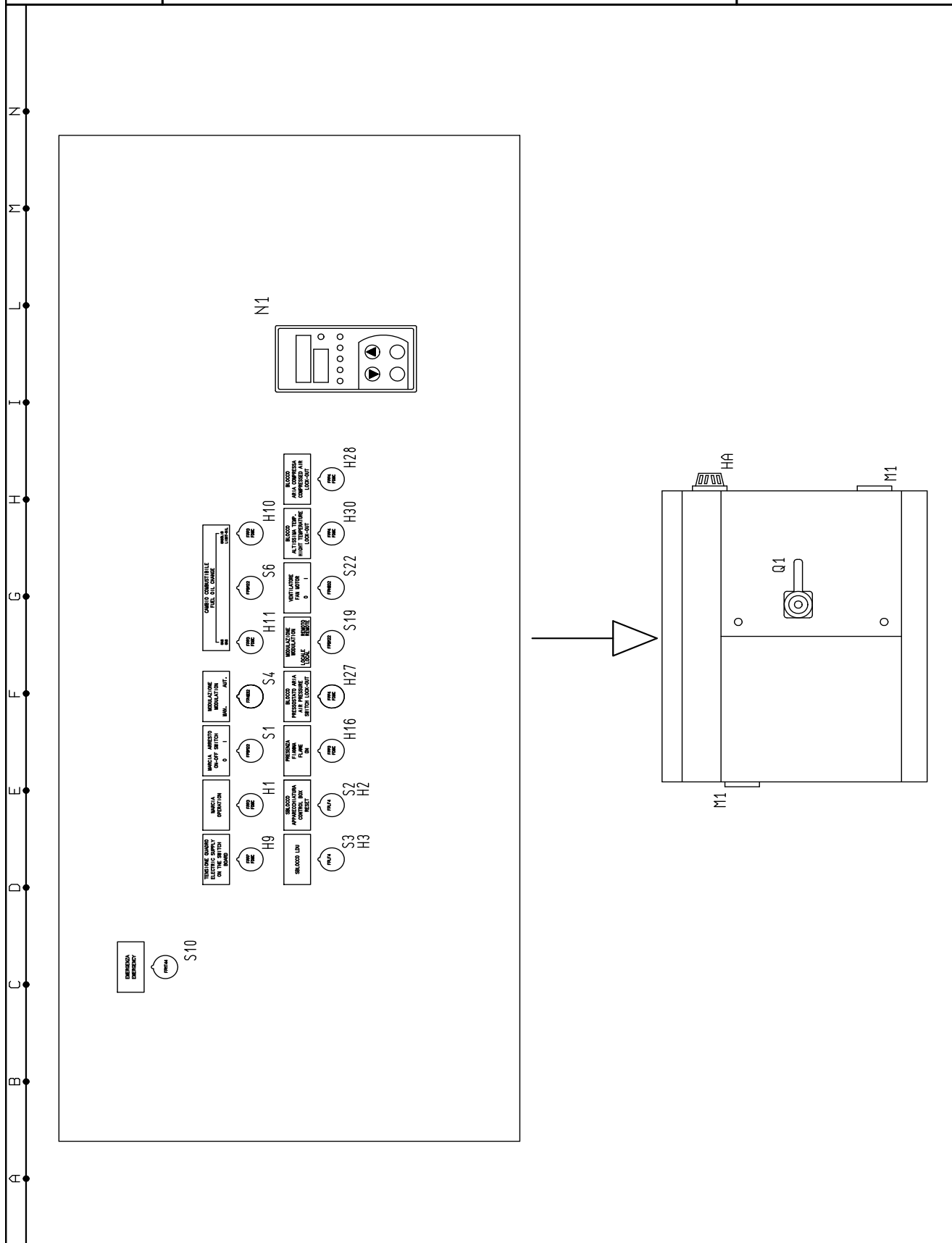


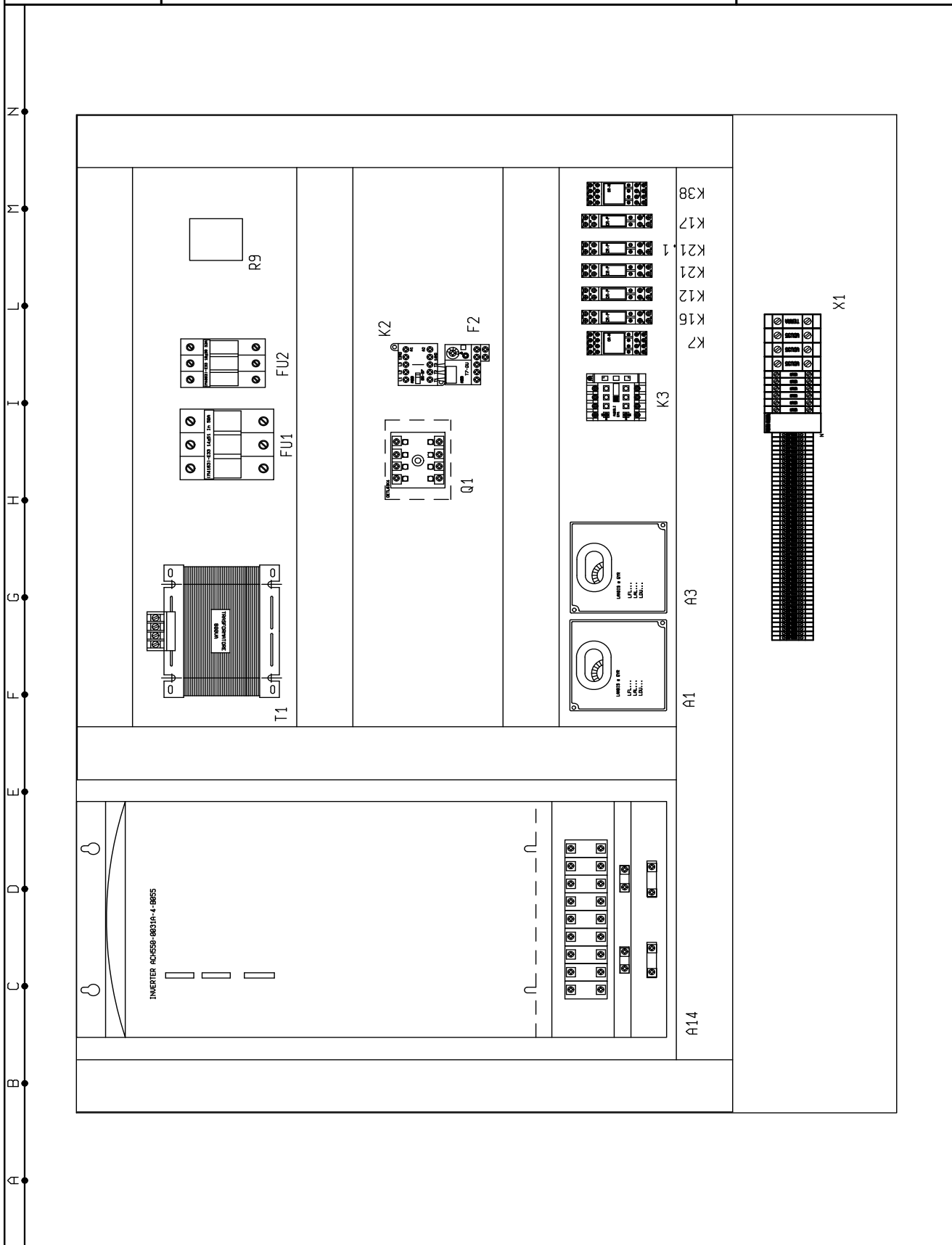












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