VESUVIUS®
SYSTEMS

CALIBRATED NOZZLE CHANGER

CUSTOMER FILE

MECHANICAL EQUIPMENT

HYDRAULIC EQUIPMENT

TOOLS

INSTRUCTIONS

REFRACTORIES

PURCHASE

AUTOMATION

1	INSTALLATION/LAYOUT DWG
2	MECHANISM
3	MECHANICAL ANCILLIARIES
4	HYDRAULIC LAYOUT
5	HYDRAULIC UNIT
6	HYDRAULIC VALVE BLOCKS
7	HYDRAULIC CYLINDER
8	HYDRAULIC HOSES
9	GENERAL INFO ON HYDRAULIC
10	TOOLS
11	INSTRUCTION MANUALS
12	REFRACTORY DRAWINGS
13	SCOPE OF SUPPLY
14	RECOMMENDED SPARE PARTS LIST
15	HARDWARE MANUAL
16	SOFTWARE MANUAL

VESUVIUS®
SYSTEMS

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MECHANICAL EQUIPMENT

HYDRAULIC EQUIPMENT

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REFRACTORIES

PURCHASE

AUTOMATION

1	**INSTALLATION/LAYOUT DWG**
2	
3	
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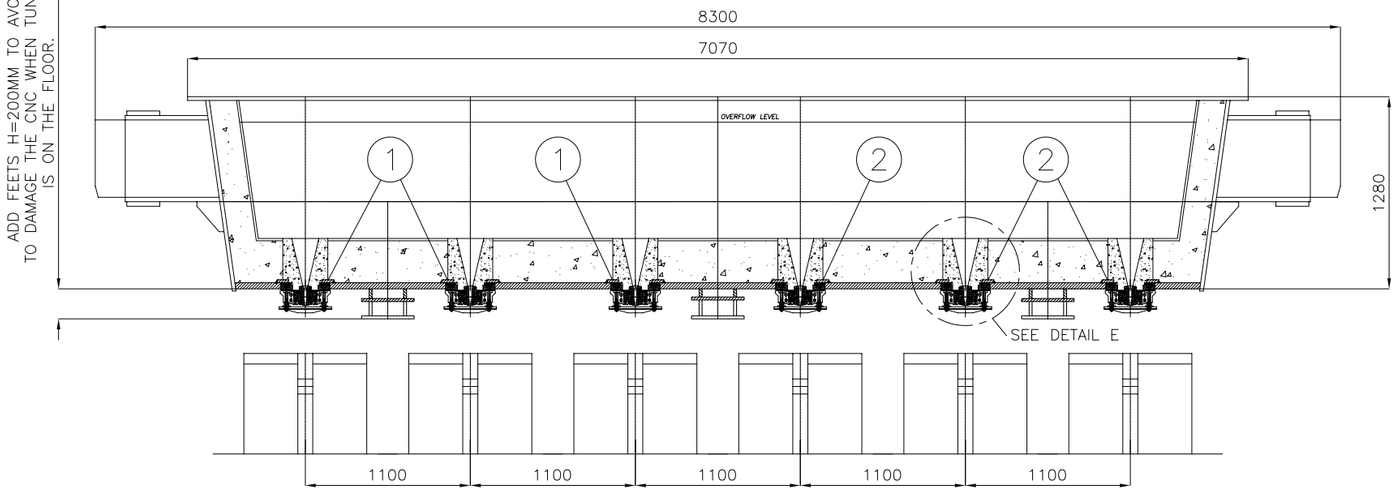
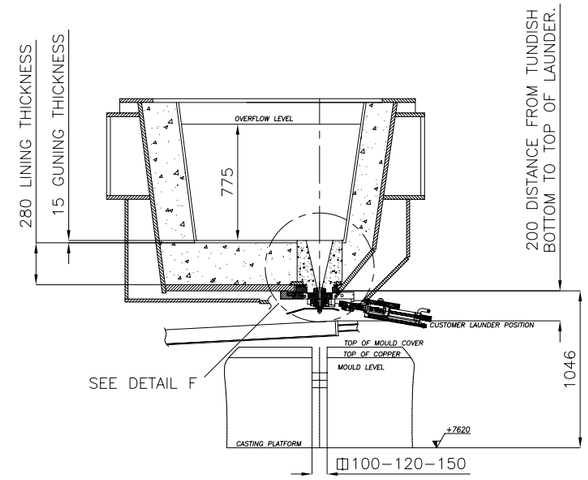
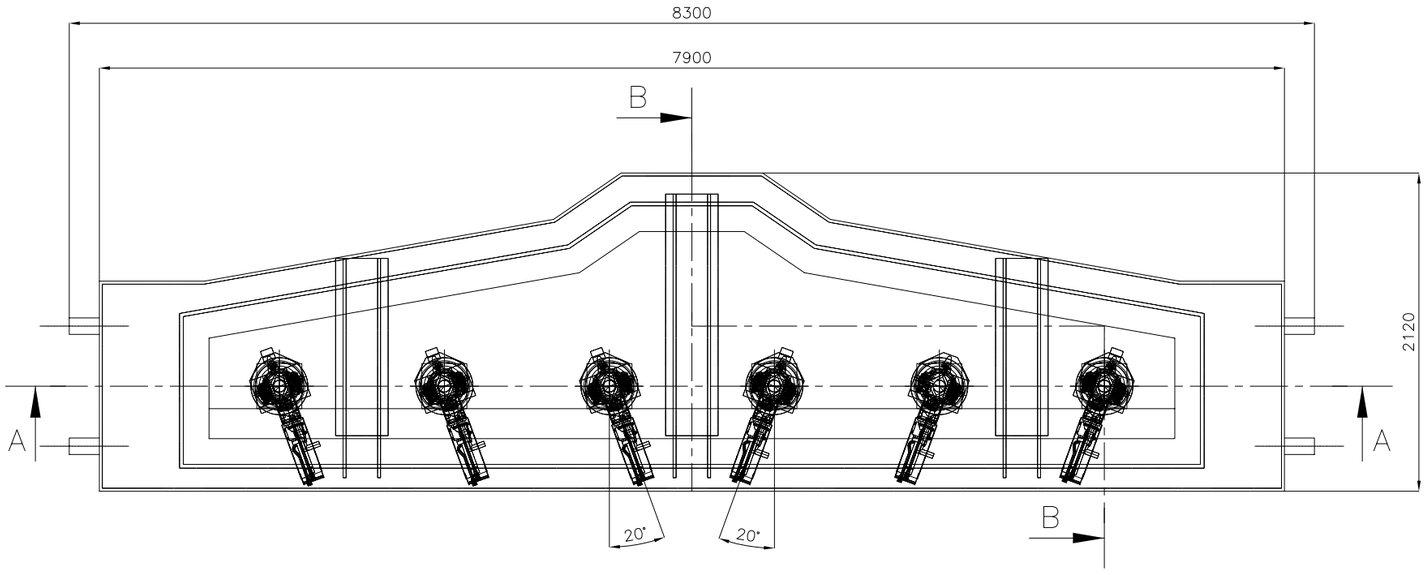
SECTION A–A:

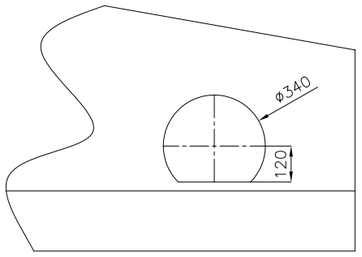


SECTION B–B:



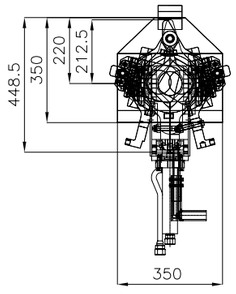


TUNDISH MODIFICATION:
SCALE 1/10

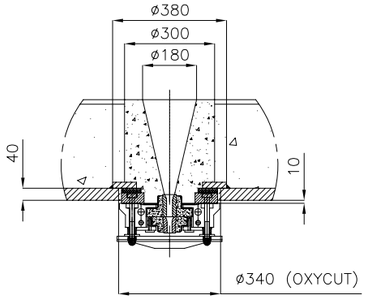


CNC GATE
SCALE 1/10

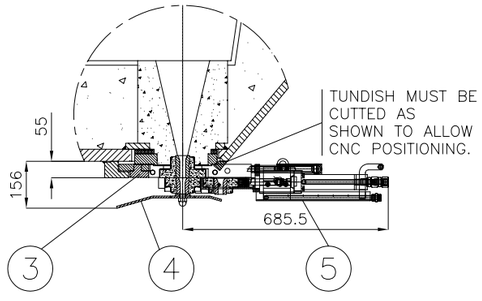
Tundish back side



DETAIL E:
SCALE 1/10



DETAIL F:
SCALE 1/10



CUSTOMER DRAWINGS REFERENCE :

- 8–57998M4 MOULD
- 8–5199205 TUNDISH
- 8–66171B0 TUNDISH

ITEM	DESIGNATION	NUMBER	QTY.			SUPPLY BY
5	PLATE LOADER EXTENDED ASSY DIA40	9C67151	6			
4	HEAT SHIELD CNC	9A28338	6			
3	CNC GATE ASSY W/O HEAT SHIELD	9A59165	6			
2	TUNDISH ADAPTATION 20° RIGHT	9E01646	3			
1	TUNDISH ADAPTATION 20° LEFT	9E01647	3			

VESUVIUS

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PROJECT Nbr		PR61113
DRAWN	23/11/2006	NAL
APPROVED FOR MANUFACTURING	24/11/2006	EPE
SCALE: 1/20		

TITLE	MOD.	NUMBER	VERS.
TUNDISH INSTALLATION LAYOUT	CNC	9E01535	0

VESUVIUS SYSTEMS

CALIBRATED NOZZLE CHANGER

CUSTOMER FILE

MECHANICAL EQUIPMENT

1

2 **MECHANISM**

3

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HYDRAULIC EQUIPMENT

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6

7

8

9

TOOLS

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INSTRUCTIONS

11

REFRACTORIES

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PURCHASE

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14

AUTOMATION

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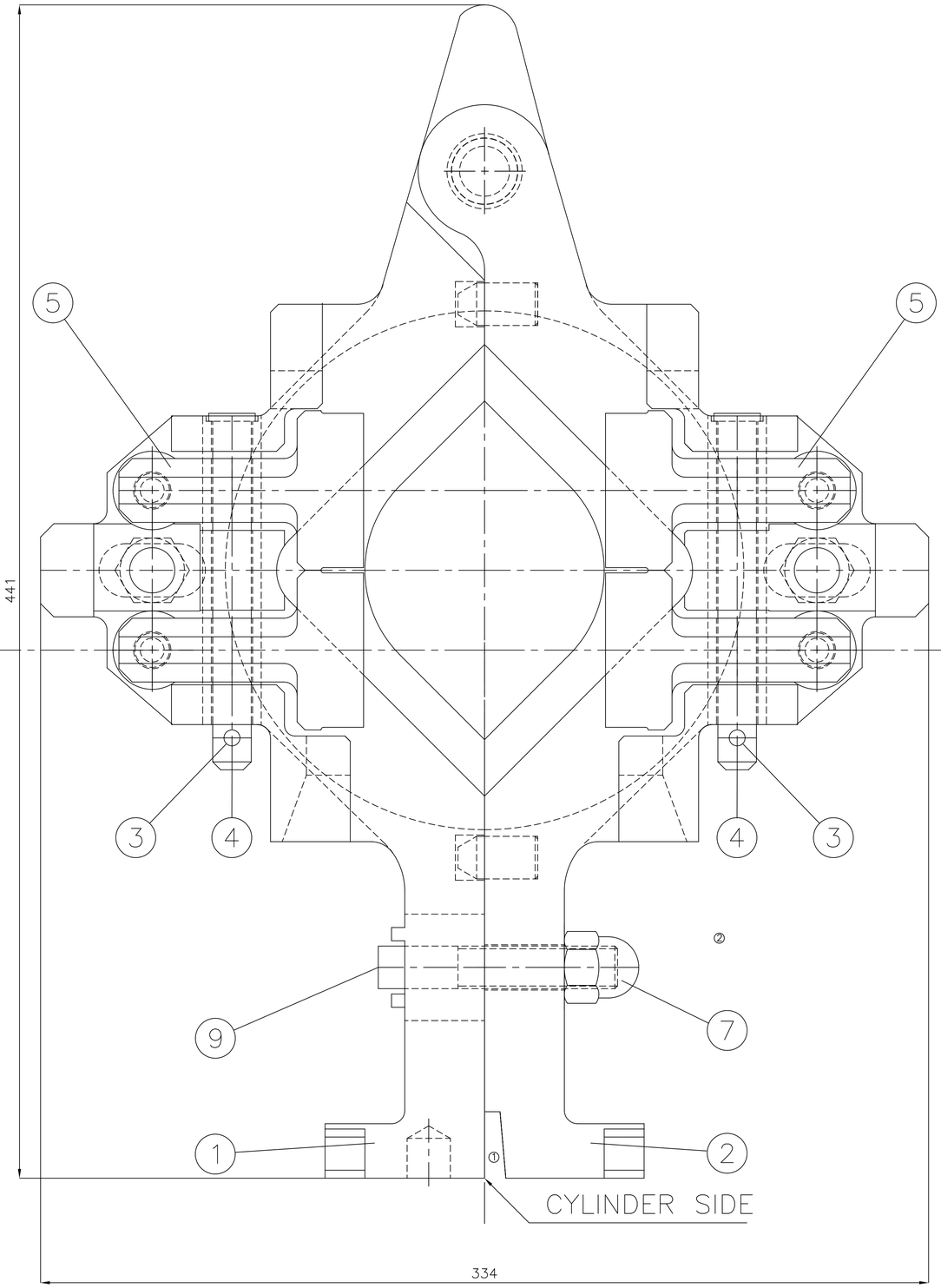
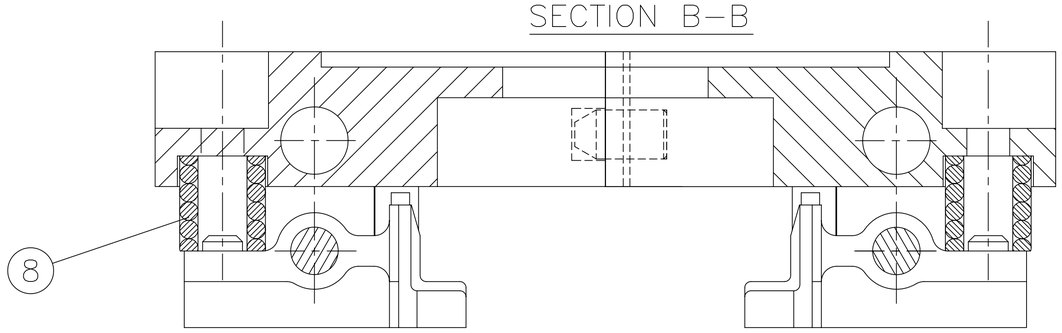
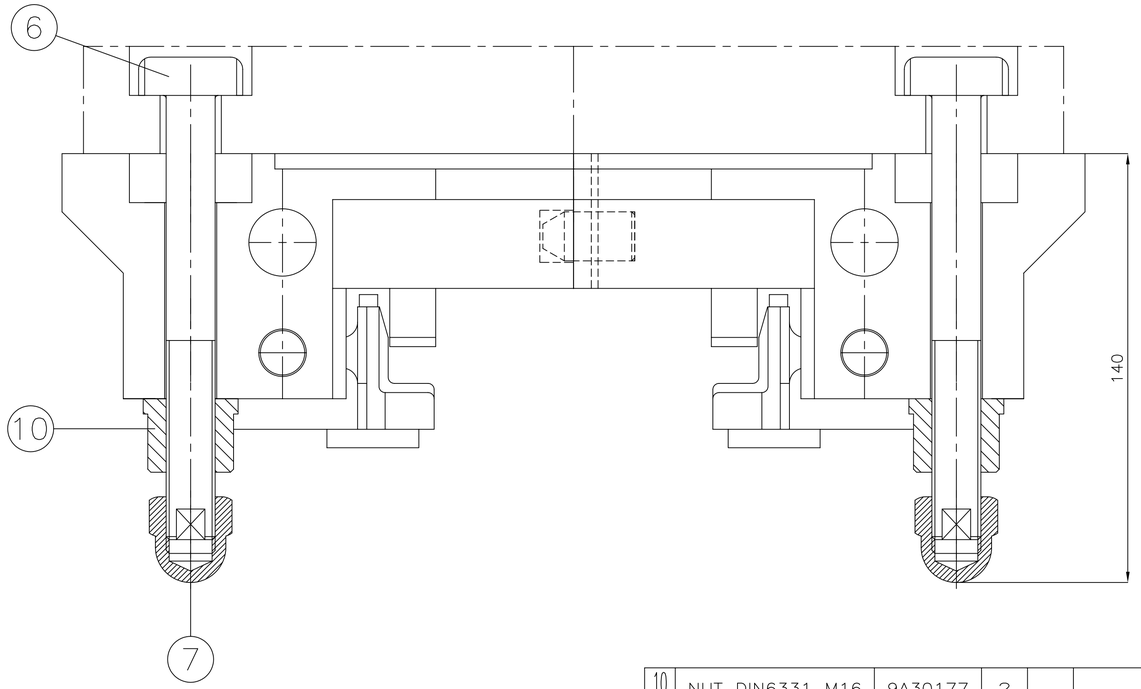
16



SECTION B–B





ITEM	DESIGNATION	NUMBER	QTY.	Name	Number	MATERIAL	WEIGHT
10	NUT DIN6331 M16	9A30177	2				
④ 9	TBOLT 75	9A31241	1				
8	SPRING	9A23917	4				
7	NUT DIN1587 M16–INOX	9A31175	3				
③ 6	TBOLT 145	9B59272	2				
5	ROCKER	0008446	4				
4	ROCKER SHAFT	9A04396	2				
3	PIN DIN1481 ø6x30	0756700	2				
2	MALE MAIN FRAME	9A23792	1				
1	FEMALE MAIN FRAME	9A23800	1				

UNLESS OTHERWISE SPECIFIED	Nominal dim. Above mm:	Nominal dim. until mm:	Linear tol. mm:
	–	6	±0.2
	6	30	±0.5
	30	120	±0.8
	120	315	±1.2
	315	1000	±2.0
	1000	2000	±3.0
	2000	4000	±4.0

Angular tol : Undimensioned radii : All sharp corners to be chamfered.

	DATE	BY
DRAWN	6/14/1999	TSM
CHECKED		
APPROVED FOR MANUFACTURING	6/15/1999	LR
PROJECT Nr	MACHINING	

VESUVIUS INTERNATIONAL

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SCALE: 1 / 1

2/10/2004	12/13/2002	DATE
CCO	CCO	DRAWN
LR	LR	CHECKED
④	3	VERSION

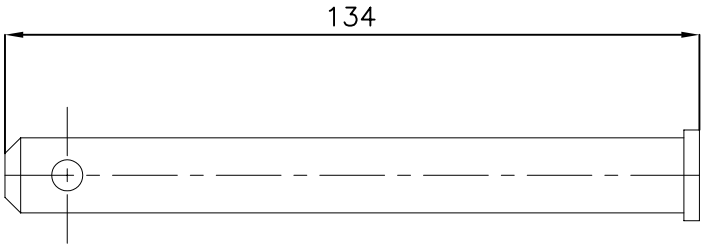
TITLE	MOD.	NUMBER	VERS.
CNC GATE ASSY W/O HEAT SHIELD	CNC	9A59165	4

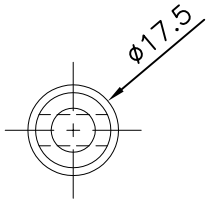
VESUVIUS GROUP S.A.
Rue de Douvrain, 17
B-7011 GHLIN
BELGIQUE

Vesuvius Systems Ghlin | Item's part List | BOM Level: Level 0

	9A59165	**9A59165**	**CNC GATE ASSY W/O HEAT SHIELD**				**A1**

Level	Items	DWG Nbr	Type	Marker	Description	Quantity	Unit	Format
0	9A23800	9A23800 - 14	BOM	1	MAIN FRAME FEMALE CNC	1,00	PC	A0
0	9A30177	9A30177 -	Item	10	NUT DIN6331 M16	2,00	PC	A4
0	9A23792	9A23792 - 15	BOM	2	MAIN FRAME MALE CNC	1,00	PC	A0
0	0756700	0756700 -	Item	3	PIN DIN1481 DIA06X30	2,00	PC	A4
0	9A04396	9A04396 - 05	Item	4	ROCKER SHAFT	2,00	PC	A3
0	0008446	0008446 - 05	BOM	5	ROCKER CNC	4,00	PC	A2
0	9B59272	9B59272 - 03	Item	6	T BOLT 145	2,00	PC	A3
0	9A31175	9A31175 -	Item	7	NUT DIN1587 M16-I	3,00	PC	A4
0	9A23917	9A23917 -	Item	8	SPRING	4,00	PC	A4
0	9A31241	9A31241 - 02	Item	9	T BOLT 75	1,00	PC	A3





ITEM	DESIGNATION	NUMBER	QTY.	Name / Number / MATERIAL	WEIGHT

UNLESS OTHERWISE SPECIFIED	Nominal dim. Above mm:	Nominal dim. until mm:	Linear tol. mm:
	–	6	±0.2
	6	30	±0.5
	30	120	±0.8
	120	315	±1.2
	315	1000	±2.0
	1000	2000	±3.0
	2000	4000	±4.0

Angular tol : Undimensioned
radii : All sharp corners to be chamfered.

	DATE	BY
DRAWN	11/02/1997	MDR
CHECKED		
APPROVED FOR MANUFACTURING	4/11/2002	CAL
PROJECT Nr	MACHINING	

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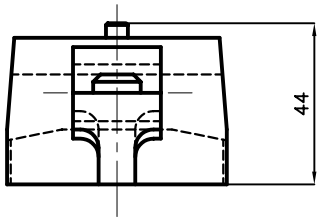
3,2

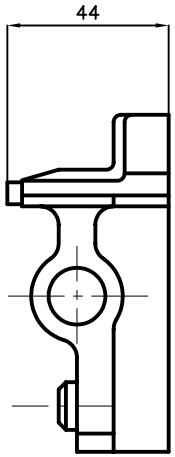
SCALE: 1 / 1

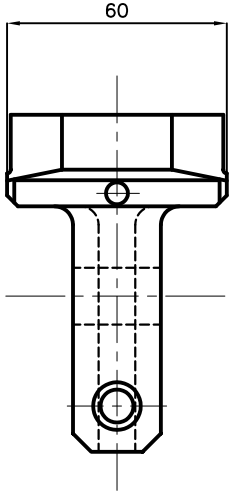
TRACABILITY PUR 34
– Markings must be easily readable
– Mark Vesuvius logo + Supplier Initials ex. : (DD)

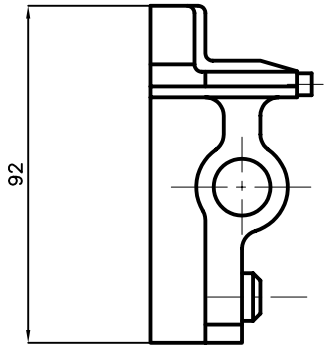
DATE	18/04/2005	24/09/2004	
DRAWN	SMA	CCO	
CHECKED	CLD	SC	
VERSION	5	4	

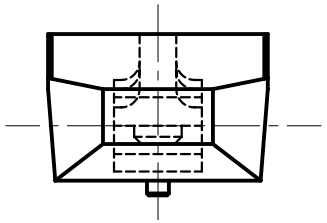
TITLE	MOD.	NUMBER	VERS.
ROCKER SHAFT	CNC	9A04396	05











ITEM	DESIGNATION	NUMBER

Nominal dim. Above mm:	until mm:	Linear tol. mm:
–	6	±0.2
6	30	±0.5
30	120	±0.8
120	315	±1.2
315	1000	±2.0
1000	2000	±3.0
2000	4000	±4.0

UNLESS OTHERWISE SPECIFIED

Angular tol : Undimensioned radii : All sharp corners to be chamfered.

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TITLE

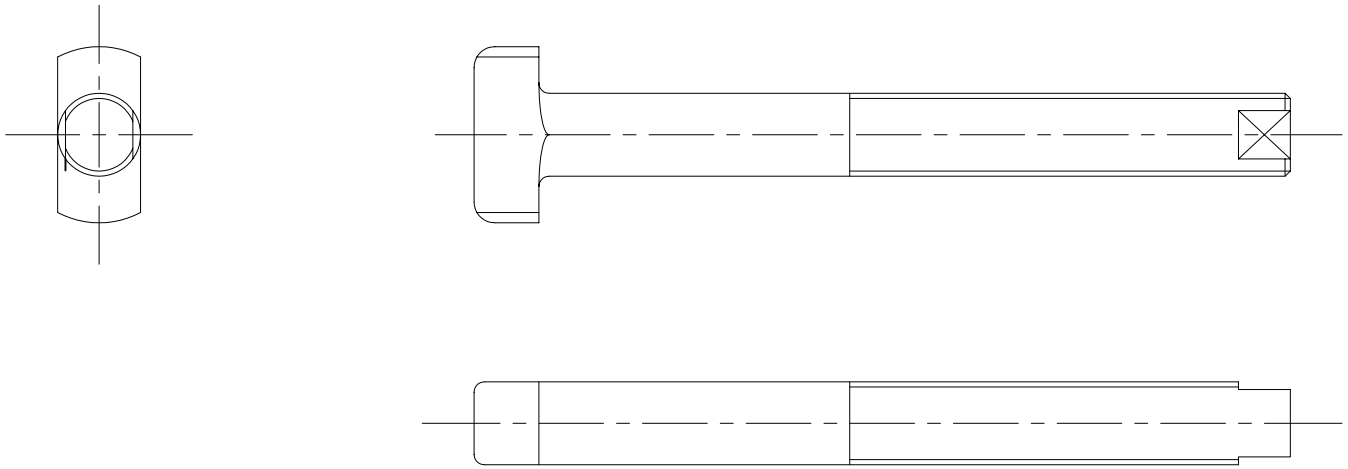
ROCKER

QTY.	Name	Number	WEIGHT
	MATERIAL		

	DATE	BY
DRAWN	12/06/1997	MDR
CHECKED		
APPROVED FOR MANUFACTURING	12/06/1997	LR
PROJECT Nr	MACHINING	
	~	
	SCALE: 1/1	

MOD.	NUMBER	VERS.
CNC	0008446	05

TRACABILITY PUR 34 – Markings must be easily readable – Mark Vesuvius logo + Supplier initials ex. : (DD)	18/04/2005	7/04/1900	DATE
NOTE 1 DETAIL – Part number + Revision (BB) – PO + initial of TTF (CC) + Machining PO number (XXXXXX)	SMA	TSM	DRAWN
NOTE 2 DETAIL – Casting number + serial number (AA) – Casting PO number (XXXXXX)	CLD	LR	CHECKED
	5	4	VERSION



ITEM	DESIGNATION	NUMBER	QTY.	SAE 8620 Name / Number / MATERIAL	WEIGHT

UNLESS OTHERWISE SPECIFIED	Nominal dim. Above mm:	until mm:	Linear tol. mm:
	–	6	±0.2
	6	30	±0.5
	30	120	±0.8
	120	315	±1.2
	315	1000	±2.0
	1000	2000	±3.0
	2000	4000	±4.0

Angular tol : Undimensioned radii : All sharp corners to be chamfered.

VESUVIUS INTERNATIONAL

			DATE	BY
DRAWN			14/03/2001	CCO
CHECKED				
APPROVED FOR MANUFACTURING			14/03/1901	JLR
PROJECT Nr			MACHINING	
			$3{,}2\sqrt{}\ (1.6\sqrt{})$	
			SCALE: 1 / 1	

11/02/2005	22/03/1901	DATE
HBT	ROS	DRAWN
DME	JLR	CHECKED
③	2	VERSION

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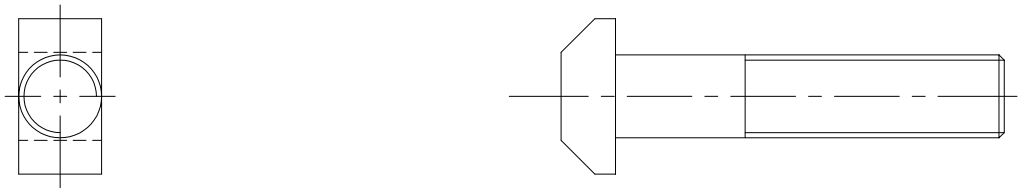
TITLE	MOD.	NUMBER	VERS.
TBOLT 145	CNC	9B59272	03



	TBOLT 100	9A26142	1			
ITEM	DESIGNATION	NUMBER	QTY.	Name	Number	WEIGHT
				MATERIAL		

UNLESS OTHERWISE SPECIFIED	Nominal dim. Above mm:	Nominal dim. until mm:	Linear tol. mm:
	–	6	±0.2
	6	30	±0.5
	30	120	±0.8
	120	315	±1.2
	315	1000	±2.0
	1000	2000	±3.0
	2000	4000	±4.0

Angular tol : Undimensioned radii : All sharp corners to be chamfered.

	DATE	BY
DRAWN	26/11/1997	AY
CHECKED		
APPROVED FOR MANUFACTURING	1/12/1997	LR
PROJECT Nr	MACHINING	
	(∼)	
	SCALE: 1 / 1	

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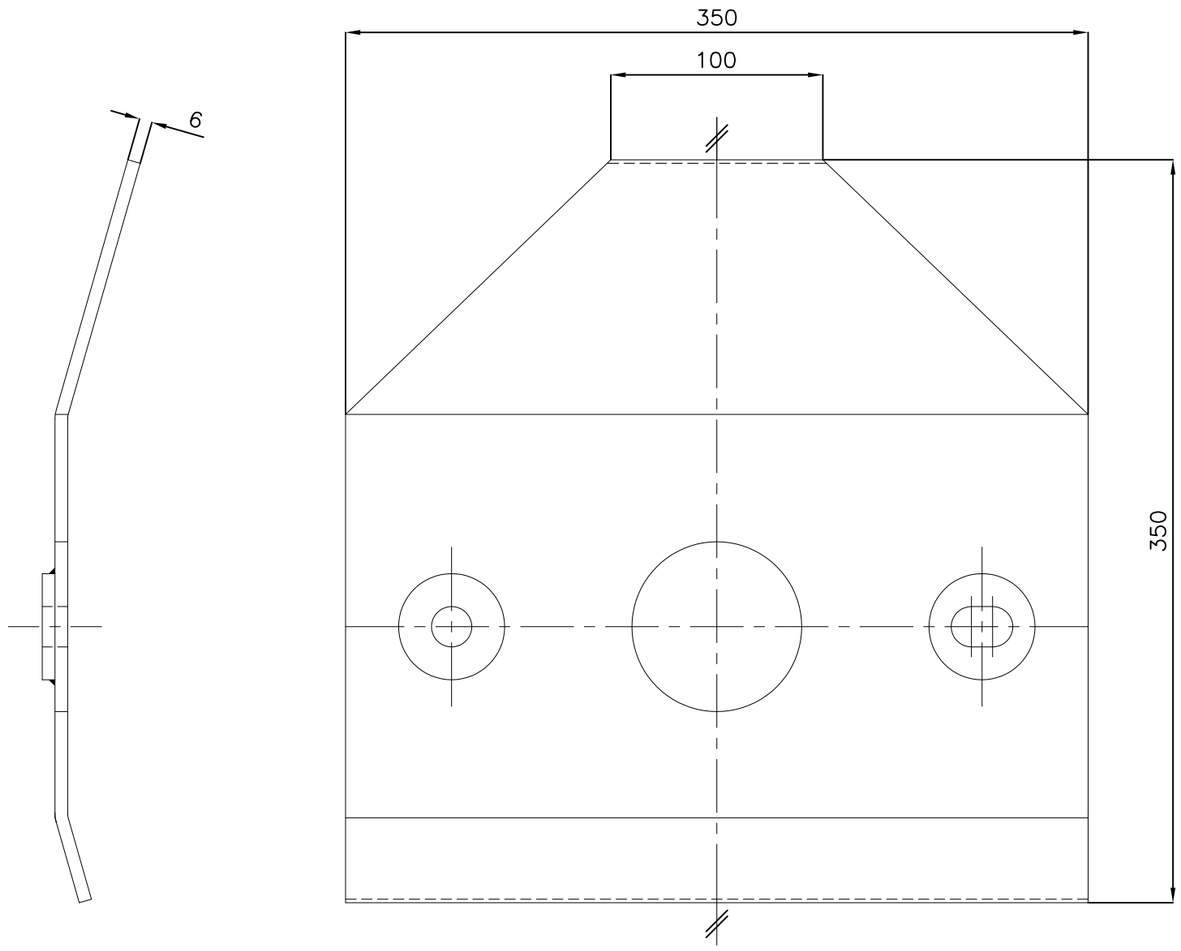
17/11/2004	10/02/2004	DATE
CCO	CCO	DRAWN
JLR	LR	CHECKED
②	1	VERSION

TITLE	MOD.	NUMBER	VERS.
TBOLT 75	CNC	9A31241	02



TRACABILITY PUR 34 – Markings must be easily readable – Mark Vesuvius logo + Supplier Initials ex. : (DD)	19/04/2005	2/03/2005	DATE
NOTE 1 DETAIL – Part number + Revision (BB) – PO + initial of TTF (CC) + Machining PO number (XXXXXX)	SMA	CCO	DRAWN
	CLD	LR	CHECKED
	⑦	6	VERSION

ITEM	DESIGNATION	NUMBER	QTY.	MATERIAL: AISI316	WEIGHT
				Name / Number	

UNLESS OTHERWISE SPECIFIED	Nominal dim. Above mm:	until mm:	Linear tol. mm:
	–	6	±0.2
	6	30	±0.5
	30	120	±0.8
	120	315	±1.2
	315	1000	±2.0
	1000	2000	±3.0
	2000	4000	±4.0

Angular tol : Undimensioned radii : All sharp corners to be chamfered.

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	DATE	BY
DRAWN	23/09/1997	MDR
CHECKED		
APPROVED FOR MANUFACTURING	1/12/1997	FNR
PROJECT Nr	MACHINING	
	~	
	SCALE: 1/2	

TITLE	MOD.	NUMBER	VERS.
HEAT SHIELD CNC	CNC	9A28338	07

VESUVIUS®
SYSTEMS

CALIBRATED NOZZLE CHANGER

CUSTOMER FILE

MECHANICAL EQUIPMENT

HYDRAULIC EQUIPMENT

TOOLS

INSTRUCTIONS

REFRACTORIES

PURCHASE

AUTOMATION

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3 MECHANICAL ANCILLIARIES
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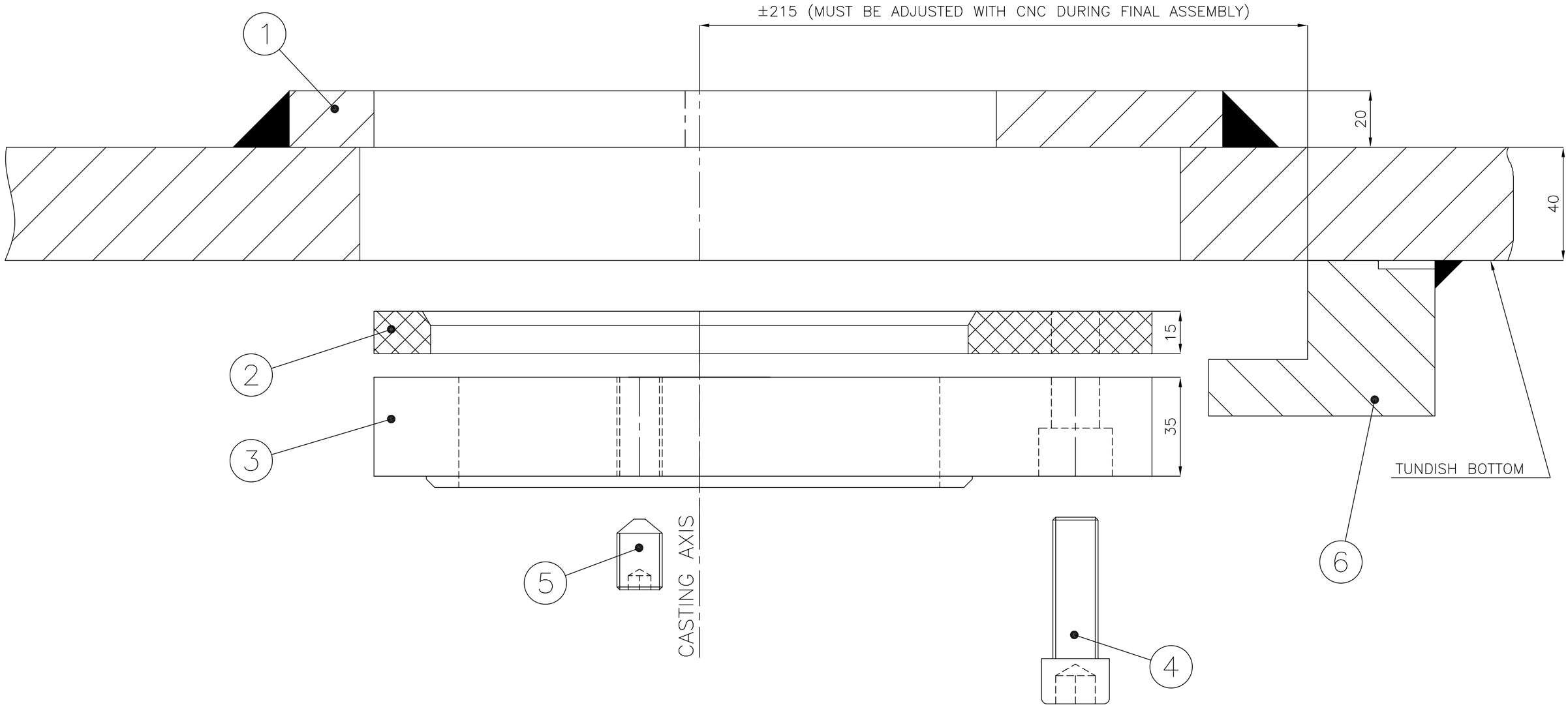

CASTING FLOOR SIDE

WELD ◣ 15 MM ALL AROUND

CASTING AXIS AND NUT PLATE AXIS MUST BE CONCENTRIC WITHIN 1 MM

ITEM	DESIGNATION	NUMBER	QTY.			WEIGHT
6	SUPPORT BLOCK	0009679	1			
5	SCREW DIN914 M16x25	0004095	3			
4	SCREW DIN912 M16x50	1950300	3			
3	MOUNTING RING CUTTING 20° LEFT ASSY	9E01655	1			
2	LEVEL PLATE CUTTING 20° LEFT	9E01537	1			
1	NUT PLATE CUTTING 20° LEFT	9E01640	1			

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WEIGHT		
DRAWN	23/11/2006	NAL
APPROVED FOR MANUFACTURING	24/11/2006	EPE
SCALE: 1 / 1		

TRACABILITY PUR 34
- Markings must be easily readable
- Mark Vesuvius logo + Supplier Initials ex. : (DD)

TITLE	MOD.	NUMBER	VERS.
TUNDISH ADAPTATION 20° LEFT	CNC	9E01647	0

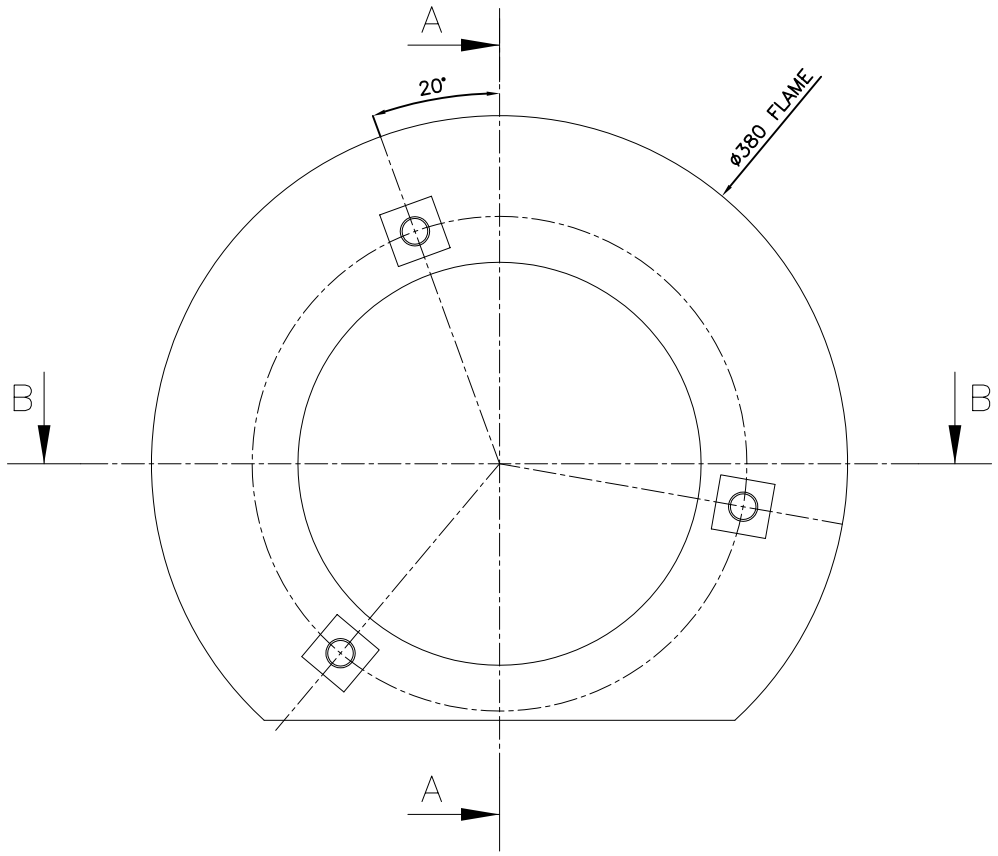
VESUVIUS GROUP S.A.
Rue de Douvrain, 17
B-7011 GHLIN
BELGIQUE

Vesuvius Systems Ghlin | Item's part List | BOM Level: Level 0

	9E01647	**9E01647**	**TUNDISH ADAPTATION 20° LEFT**				**A2**

Level	Items	DWG Nbr	Type	Marker	Description	Quantity	Unit	Format
0	9E01640	9E01640 - 00	Item	1	NUT PLATE CUTTING 20° LEFT	1,00	PC	A2
0	9E01537	9E01537 - 00	Item	2	LEVEL PLATE CUTTING 20° LEFT	1,00	PC	A2
0	9E01655	9E01655 - 00	BOM	3	MOUNTING RING CUTTING 20° LEFT	1,00	PC	A1
0	1950300	1950300 -	Item	4	SCREW DIN912 M16X50	3,00	PC	A4
0	0004095	0004095 -	Item	5	SCREW DIN914 M16X25	3,00	PC	A4
0	0009679	0009679 - 01	Item	6	SUPPORT BLOCK	1,00	PC	A3

Tundish back side



Operator side

SECTION A–A:

SECTION B–B:

TRACABILITY PUR 34
- Markings must be easily readable
- Mark Vesuvius logo + Supplier initials ex. : (DD)

NOTE 1 DETAIL
- Part number + Revision (BB)
- PO + initial of TTF (CC) + Machining PO number (XXXXXX)

ITEM	DESIGNATION	NUMBER	QTY.	Name	Number	WEIGHT
				MATERIAL		

Nominal dim. Above mm:	until mm:	Linear tol. mm:
–	6	±0.2
6	30	±0.5
30	120	±0.8
120	315	±1.2
315	1000	±2.0
1000	2000	±3.0
2000	4000	±4.0

UNLESS OTHERWISE SPECIFIED

Angular tol : Undimensioned
radii : All sharp corners to be chamfered.

MACHINING		
MATERIAL	St52.3	
WEIGHT		
DRAWN	23/11/2006	NAL
APPROVED FOR MANUFACTURING	24/11/2006	EPE
SCALE:	1/2	

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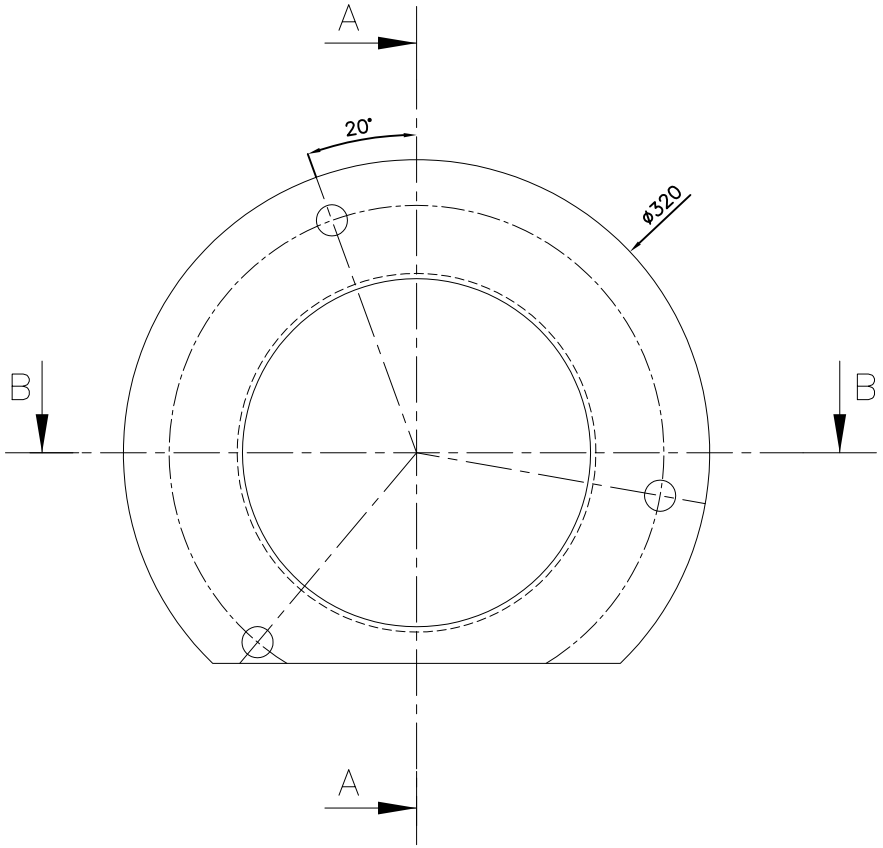
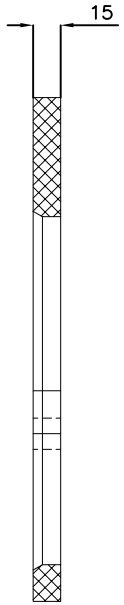
TITLE	MOD.	NUMBER	VERS.
NUT PLATE CUTTING 20° LEFT	CNC	9E01640	0

Tundish back side

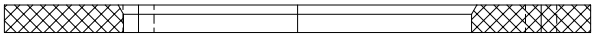


Operator side

SECTION A–A:



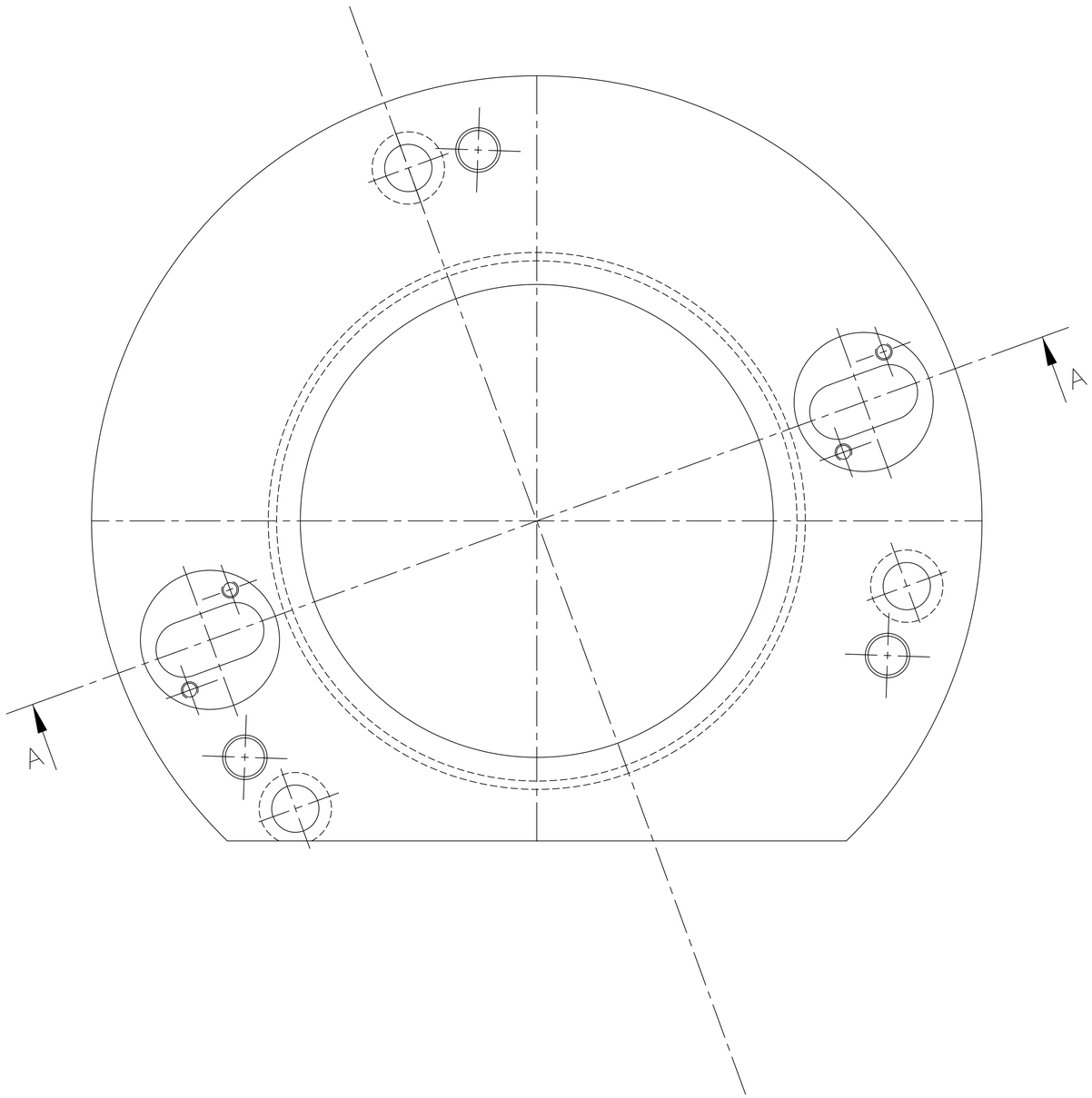
SECTION B–B:



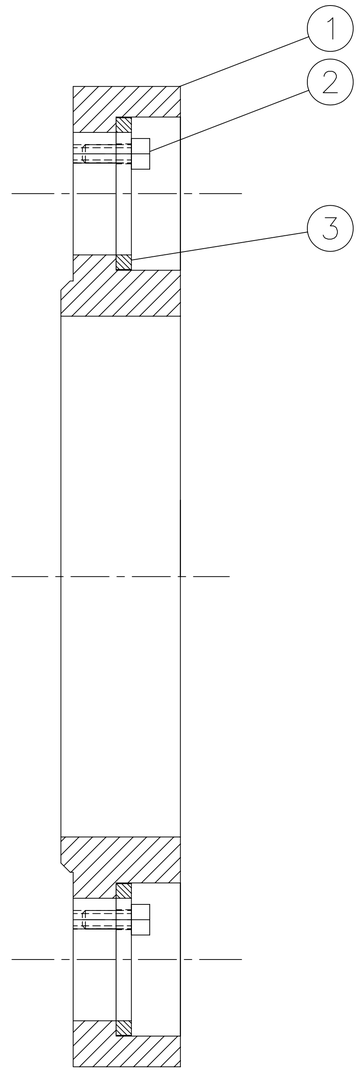
ITEM	DESIGNATION		NUMBER	QTY.	Name	Number	WEIGHT
					MATERIAL		
UNLESS OTHERWISE SPECIFIED	Nominal dim. Above mm:	until mm:	Linear tol. mm:	Angular tol : Undimensioned radii : All sharp corners to be chamfered.	MACHINING		
	–	6	±0.2				
	6	30	±0.5				
	30	120	±0.8				
	120	315	±1.2				
	315	1000	±2.0		MATERIAL	AISI 304	
	1000	2000	±3.0				
	2000	4000	±4.0				
VESUVIUS					WEIGHT		
					DRAWN	23/11/2006	NAL
This drawing is the property of VESUVIUS and must not be copied or disclosed outside our company without written permission. This drawing must be returned after use.					APPROVED FOR MANUFACTURING	24/11/2006	EPE
						SCALE: 1/2	
TITLE					MOD.	NUMBER	VERS.
LEVEL PLATE CUTTING 20° LEFT					CNC	9E01537	0

TRACABILITY PUR 34
- Markings must be easily readable
- Mark Vesuvius logo + Supplier initials ex. : (DD)

NOTE 1 DETAIL
- Part number + Revision (BB)
- PO + initial of TTF (CC) + Machining PO number (XXXXXX)



SECTION A–A



ITEM	DESIGNATION	NUMBER	QTY.	WEIGHT
3	WEARING WASHER	9A13017	2	
2	SCREW DIN912 M06x16	0741600	4	
1	MOUNTING RING CUTTING 20° LEFT	9E01644	1	

VESUVIUS

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WEIGHT		
DRAWN	23/11/2006	NAL
APPROVED FOR MANUFACTURING	24/11/2006	EPE
SCALE: 1/1		

TRACABILITY PUR 34
- Markings must be easily readable
- Mark Vesuvius logo + Supplier Initials ex. : (DD)

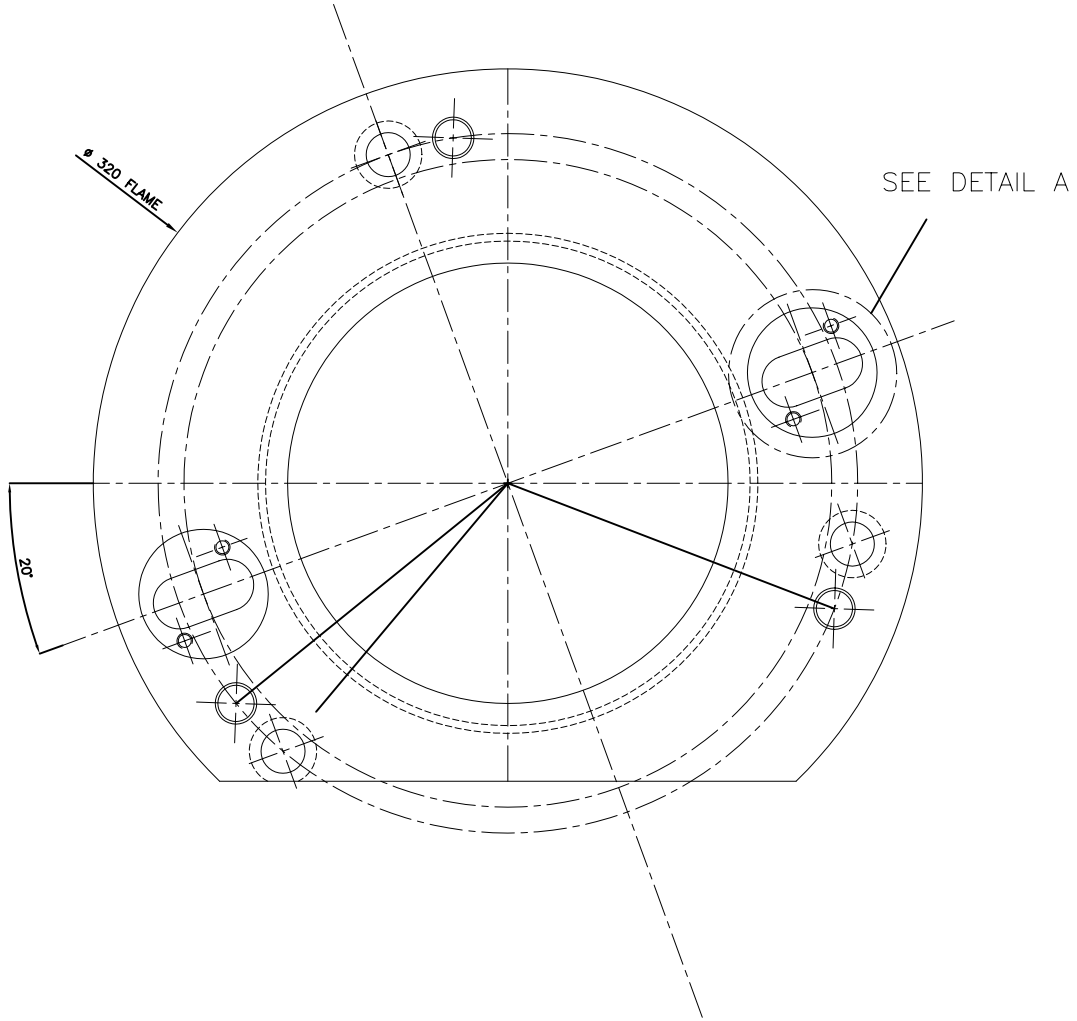
TITLE	MOD.	NUMBER	VERS.
MOUNTING RING CUTTING 20° LEFT ASSY	CNC	9E01655	0

VESUVIUS GROUP S.A.
Rue de Douvrain, 17
B-7011 GHLIN
BELGIQUE

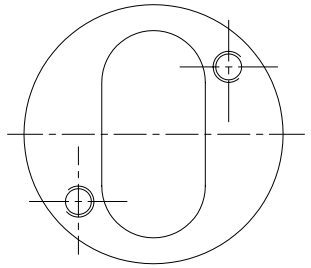
Vesuvius Systems Ghlin | Item's part List | BOM Level: Level 0

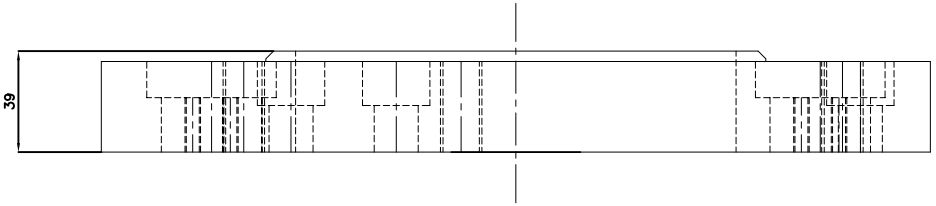
	9E01655	**9E01655**	**MOUNTING RING CUTTING 20° LEFT**				**A1**

Level	Items	DWG Nbr	Type	Marker	Description	Quantity	Unit	Format
0	9E01644	9E01644 - 00	Item	1	MOUNTING RING CUTTING 20° LEFT	1,00	PC	A1
0	0741600	0741600 -	Item	2	SCREW DIN912 M06X16	4,00	PC	A4
0	9A13017	9A13017 - 00	Item	3	WEARING WASHER	2,00	PC	A3



DETAIL A:
SCALE2/1





ITEM	DESIGNATION	NUMBER	QTY.	Name / Number	WEIGHT
				MATERIAL	

Nominal dim. Above mm:	until mm:	Linear tol. mm:
–	6	±0.2
6	30	±0.5
30	120	±0.8
120	315	±1.2
315	1000	±2.0
1000	2000	±3.0
2000	4000	±4.0

UNLESS OTHERWISE SPECIFIED

Angular tol : Undimensioned radii : All sharp corners to be chamfered.

MACHINING		
MATERIAL	St52.3	
WEIGHT		
DRAWN	23/11/2006	NAL
APPROVED FOR MANUFACTURING	24/11/2006	EPE
SCALE:	1/1	

VESUVIUS

TRACABILITY PUR 34
– Markings must be easily readable
– Mark Vesuvius logo + Supplier initials ex. : (DD)

NOTE 1 DETAIL
– Part number + Revision (BB)
– PO + initial of TIF (CC) + Machining PO number (XXXXXX)

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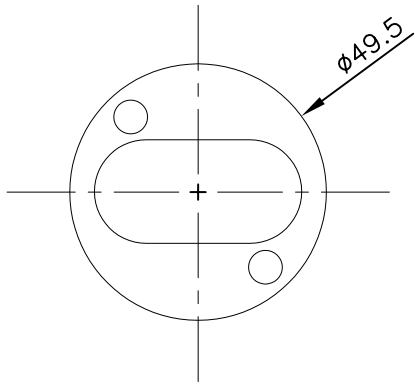
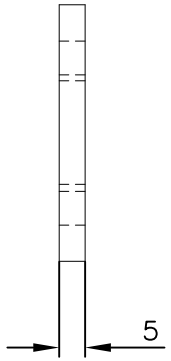
TITLE	MOD.	NUMBER	VERS.
MOUNTING RING CUTTING 20° LEFT	CNC	9E01644	0





ITEM	MOD.	DESIGNATION	NUMBER

Name	Number	Qty.	Assy.	Mach.
MATERIAL			QUANTITY	

Nominal dim. Above mm:	until mm:	Linear tol. mm:
–	6	±0.2
6	30	±0.5
30	120	±0.8
120	315	±1.2
315	1000	±2.0
1000	2000	±3.0
2000	4000	±4.0

UNLESS OTHERWISE SPECIFIED

Angular tol : Undimensioned
radii : All sharp corners to be chamfered.

	DATE	BY
DRAWN	08/10/96	MDR
CHECKED		
APPROVED FOR MANUFACTURING	08/10/96	FNR
PROJECT Nr	MACHINING	

VESUVIUS INTERNATIONAL

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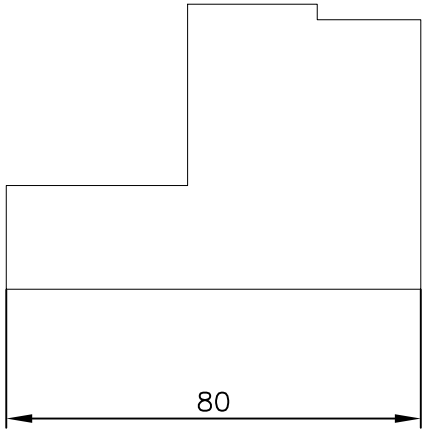
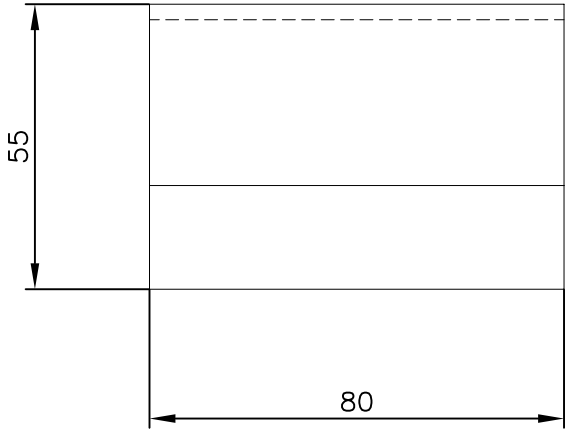
SCALE: 1/1

DATE					
QUANTITY					
ZONE					
VERSION	5	4	3	2	1

TITLE	MOD.	NUMBER	VERS.
WEARING WASHER	CNC	9A13017	00





				St37			
ITEM	DESIGNATION		NUMBER	QTY.	Name	Number	WEIGHT
					MATERIAL		

Nominal dim. Above mm:	until mm:	Linear tol. mm:
–	6	±0.2
6	30	±0.5
30	120	±0.8
120	315	±1.2
315	1000	±2.0
1000	2000	±3.0
2000	4000	±4.0

UNLESS OTHERWISE SPECIFIED

Angular tol : Undimensioned
radii : All sharp corners to be chamfered.

	DATE	BY
DRAWN	24/01/1996	LGB
CHECKED		
APPROVED FOR MANUFACTURING	9/09/2005	MDR
PROJECT Nr	MACHINING	

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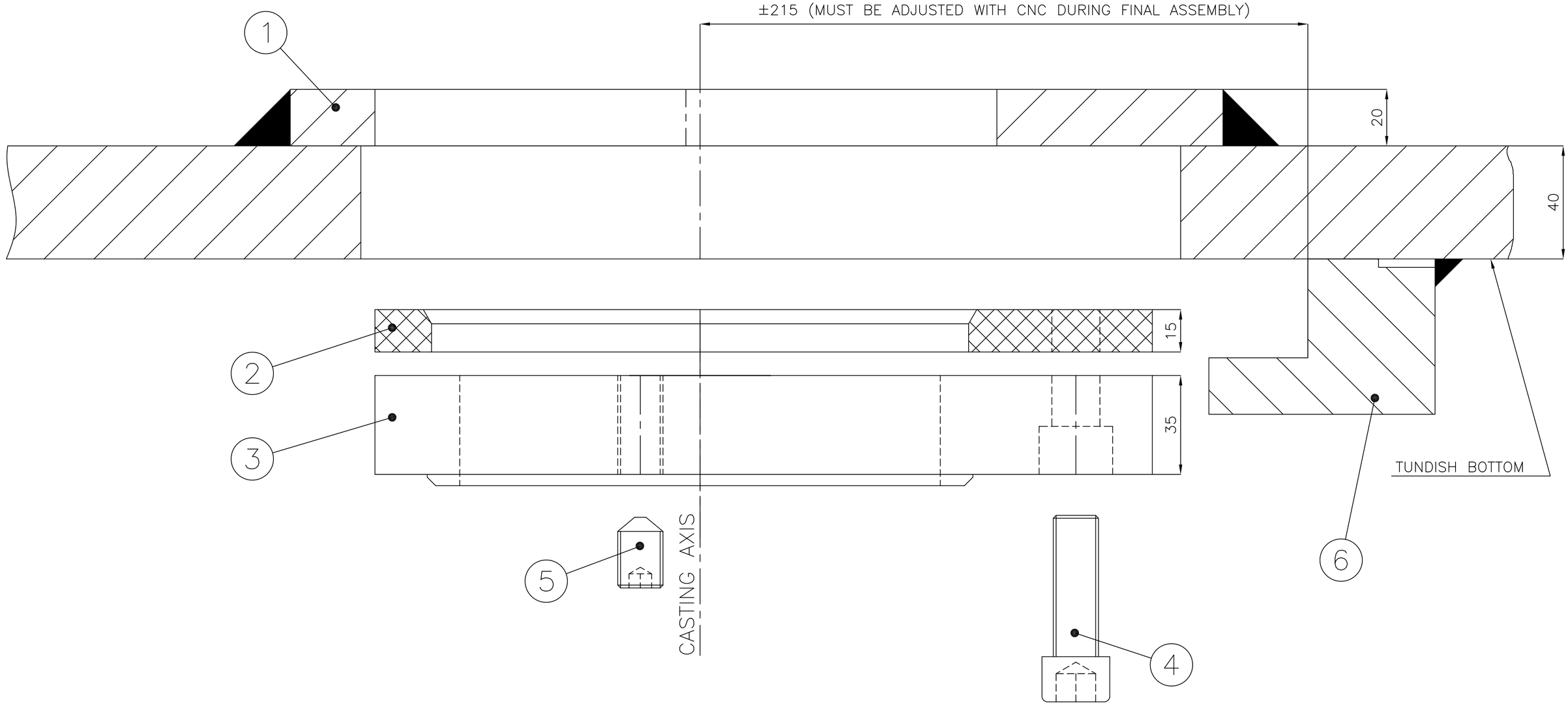
SCALE: 1 / 1

TRACABILITY PUR 34
– Markings must be easily readable
– Mark Vesuvius logo + Supplier Initials ex. : (DD)

9/09/2005		DATE
DHE		DRAWN
EPE		CHECKED
①		VERSION

TITLE	MOD.	NUMBER	VERS.
SUPPORT BLOCK	CNC	0009679	01



CASTING FLOOR SIDE

WELD ◣ 15 MM ALL AROUND

CASTING AXIS AND NUT PLATE AXIS MUST BE CONCENTRIC WITHIN 1 MM

ITEM	DESIGNATION	NUMBER	QTY.			WEIGHT
6	SUPPORT BLOCK	0009679	1			
5	SCREW DIN914 M16x25	0004095	3			
4	SCREW DIN912 M16x50	1950300	3			
3	MOUNTING RING CUTTING 20° RIGHT ASSY	9E01654	1			
2	LEVEL PLATE CUTTING 20° RIGHT	9E01643	1			
1	NUT PLATE CUTTING 20° RIGHT	9E01536	1			

VESUVIUS

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WEIGHT		
DRAWN	23/11/2006	NAL
APPROVED FOR MANUFACTURING	24/11/2006	EPE
SCALE: 1 / 1		

TRACABILITY PUR 34
- Markings must be easily readable
- Mark Vesuvius logo + Supplier Initials ex. : (DD)

TITLE	MOD.	NUMBER	VERS.
TUNDISH ADAPTATION 20° RIGHT	CNC	9E01646	0

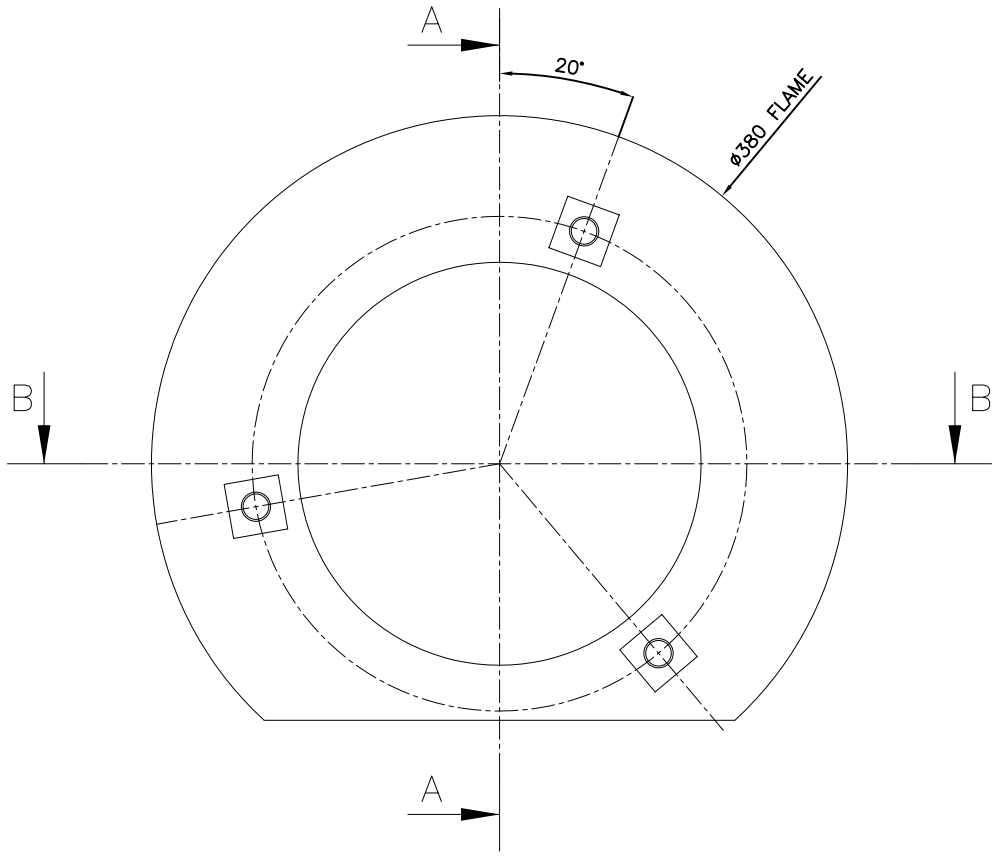
VESUVIUS GROUP S.A.
Rue de Douvrain, 17
B-7011 GHLIN
BELGIQUE

Vesuvius Systems Ghlin | Item's part List | BOM Level: Level 0

	9E01646	**9E01646**	**TUNDISH ADAPTATION 20° RIGHT**				**A2**

Level	Items	DWG Nbr	Type	Marker	Description	Quantity	Unit	Format
0	9E01536	9E01536 - 00	Item	1	NUT PLATE CUTTING 20° RIGHT	1,00	PC	A2
0	9E01643	9E01643 - 00	Item	2	LEVEL PLATE CUTTING 20° RIGHT	1,00	PC	A2
0	9E01654	9E01654 - 00	BOM	3	MOUNTING RING CUTTING 20° RIGH	1,00	PC	A1
0	1950300	1950300 -	Item	4	SCREW DIN912 M16X50	3,00	PC	A4
0	0004095	0004095 -	Item	5	SCREW DIN914 M16X25	3,00	PC	A4
0	0009679	0009679 - 01	Item	6	SUPPORT BLOCK	1,00	PC	A3

Tundish back side



Operator side

SECTION A–A:

SECTION B–B:

ITEM	DESIGNATION	NUMBER	QTY.	Name	Number	WEIGHT
				MATERIAL		

Nominal dim. Above mm:	until mm:	Linear tol. mm:
–	6	±0.2
6	30	±0.5
30	120	±0.8
120	315	±1.2
315	1000	±2.0
1000	2000	±3.0
2000	4000	±4.0

UNLESS OTHERWISE SPECIFIED

Angular tol : Undimensioned
radii : All sharp corners to be chamfered.

MACHINING	
MATERIAL	St52.3
WEIGHT	
DRAWN	23/11/2006 NAL
APPROVED FOR MANUFACTURING	24/11/2006 EPE
SCALE:	1/2

VESUVIUS

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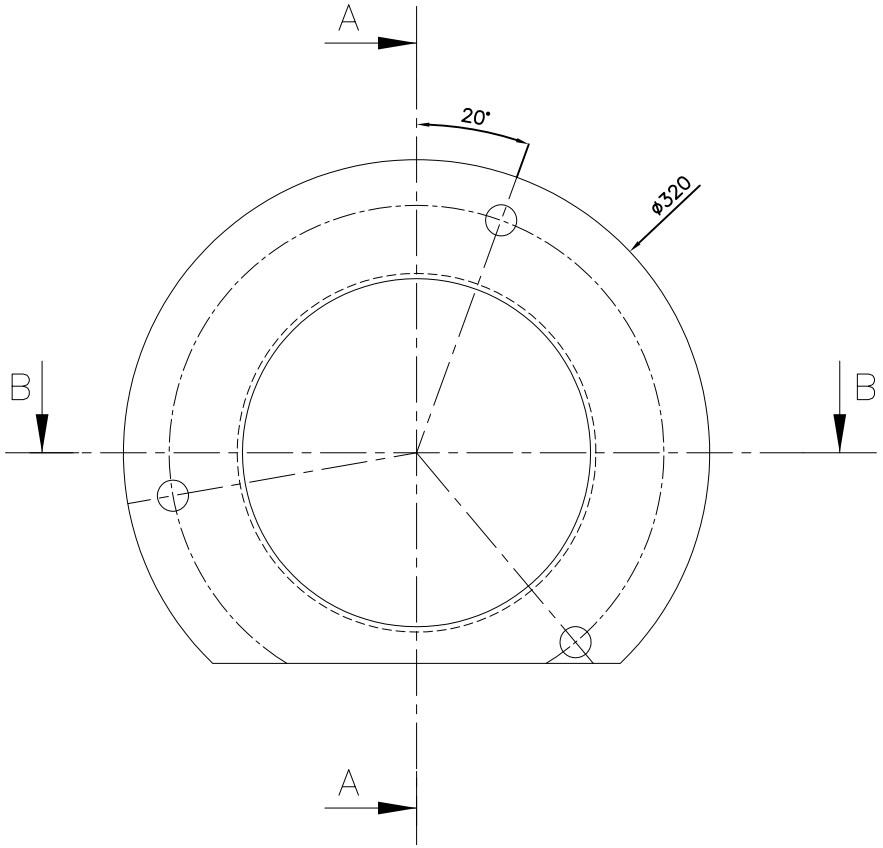
TRACABILITY PUR 34
- Markings must be easily readable
- Mark Vesuvius logo + Supplier initials ex. : (DD)

NOTE 1 DETAIL
- Part number + Revision (BB)
- PO + initial of TTF (CC) + Machining PO number (XXXXXX)

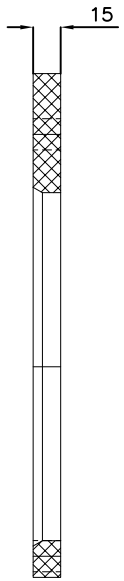
TITLE	MOD.	NUMBER	VERS.
NUT PLATE CUTTING 20° RIGHT	CNC	9E01536	0

Tundish back side

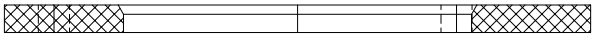


Operator side

SECTION A–A:



SECTION B–B:



ITEM	DESIGNATION	NUMBER	QTY.	Name	Number	WEIGHT
				MATERIAL		

Nominal dim. Above mm:	until mm:	Linear tol. mm:
–	6	±0.2
6	30	±0.5
30	120	±0.8
120	315	±1.2
315	1000	±2.0
1000	2000	±3.0
2000	4000	±4.0

UNLESS OTHERWISE SPECIFIED

Angular tol : Undimensioned
radii : All sharp corners to be chamfered.

MACHINING	
MATERIAL	AISI 304
WEIGHT	
DRAWN	23/11/2006 NAL
APPROVED FOR MANUFACTURING	24/11/2006 EPE
SCALE:	1/2

VESUVIUS

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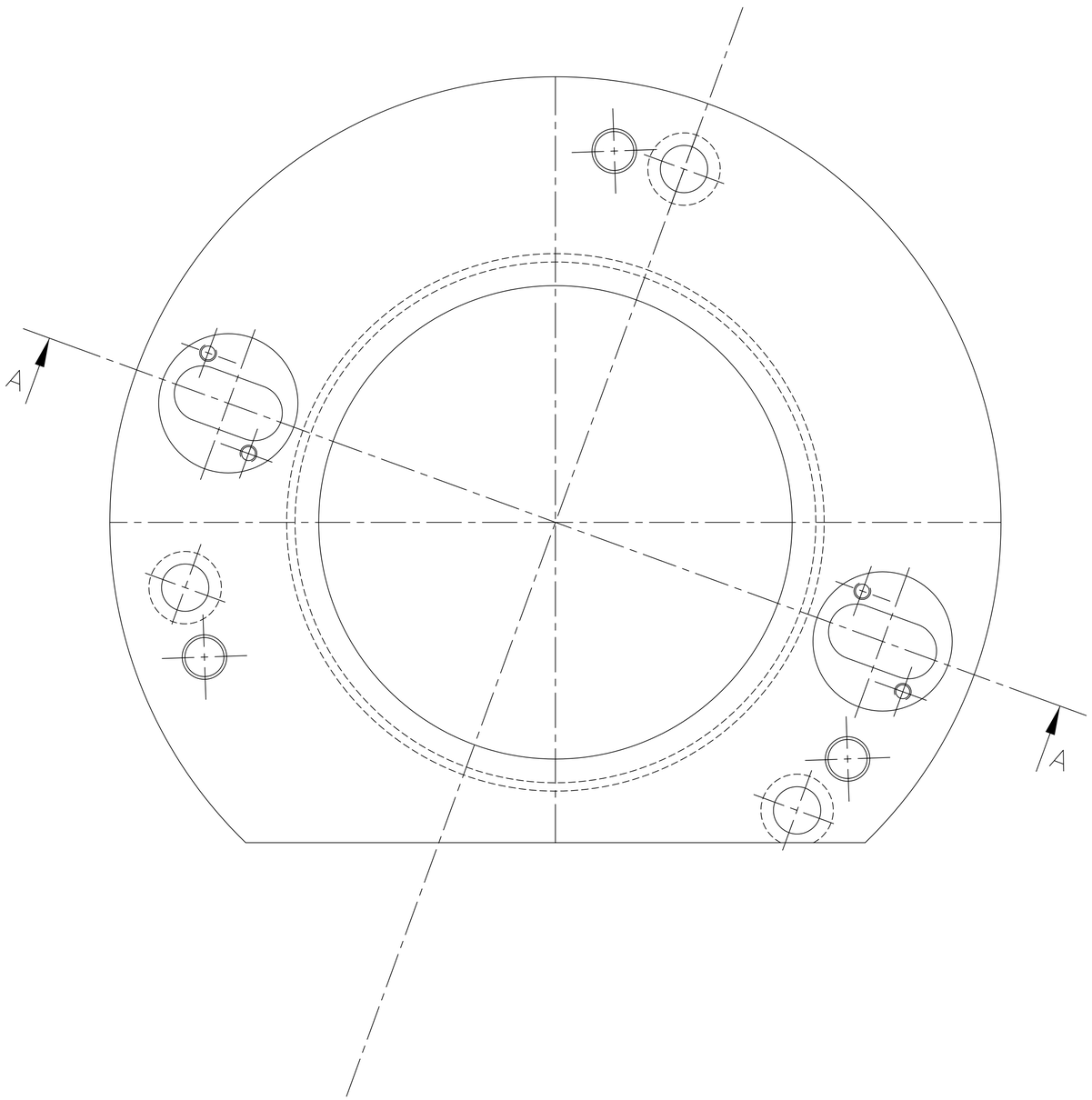
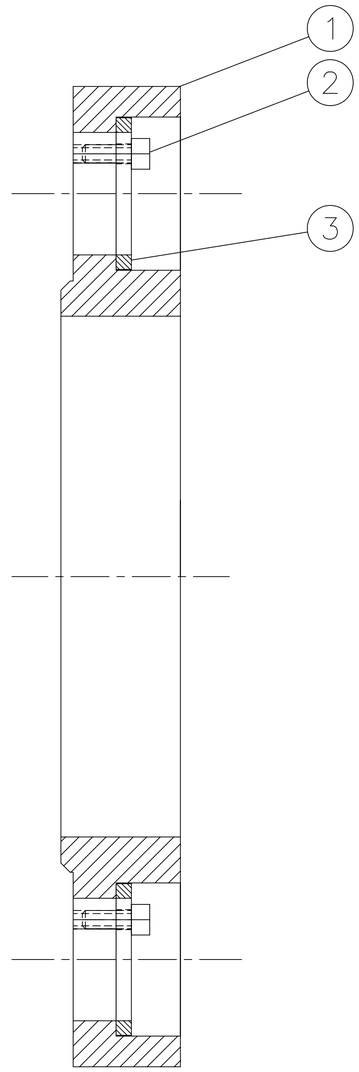
TRACABILITY PUR 34
- Markings must be easily readable
- Mark Vesuvius logo + Supplier initials ex. : (DD)

NOTE 1 DETAIL
- Part number + Revision (BB)
- PO + initial of TTF (CC) + Machining PO number (XXXXXX)

TITLE	MOD.	NUMBER	VERS.
LEVEL PLATE CUTTING 20° RIGHT	CNC	9E01643	0



SECTION A–A



ITEM	DESIGNATION	NUMBER	QTY.	WEIGHT
3	WEARING WASHER	9A13017	2	
2	SCREW DIN912 M06x16	0741600	4	
1	MOUNTING RING CUTTING 20° RIGHT	9E01538	1	

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WEIGHT		
DRAWN	23/11/2006	NAL
APPROVED FOR MANUFACTURING	24/11/2006	EPE
SCALE: 1/1		

TRACABILITY PUR 34
- Markings must be easily readable
- Mark Vesuvius logo + Supplier Initials ex. : (DD)

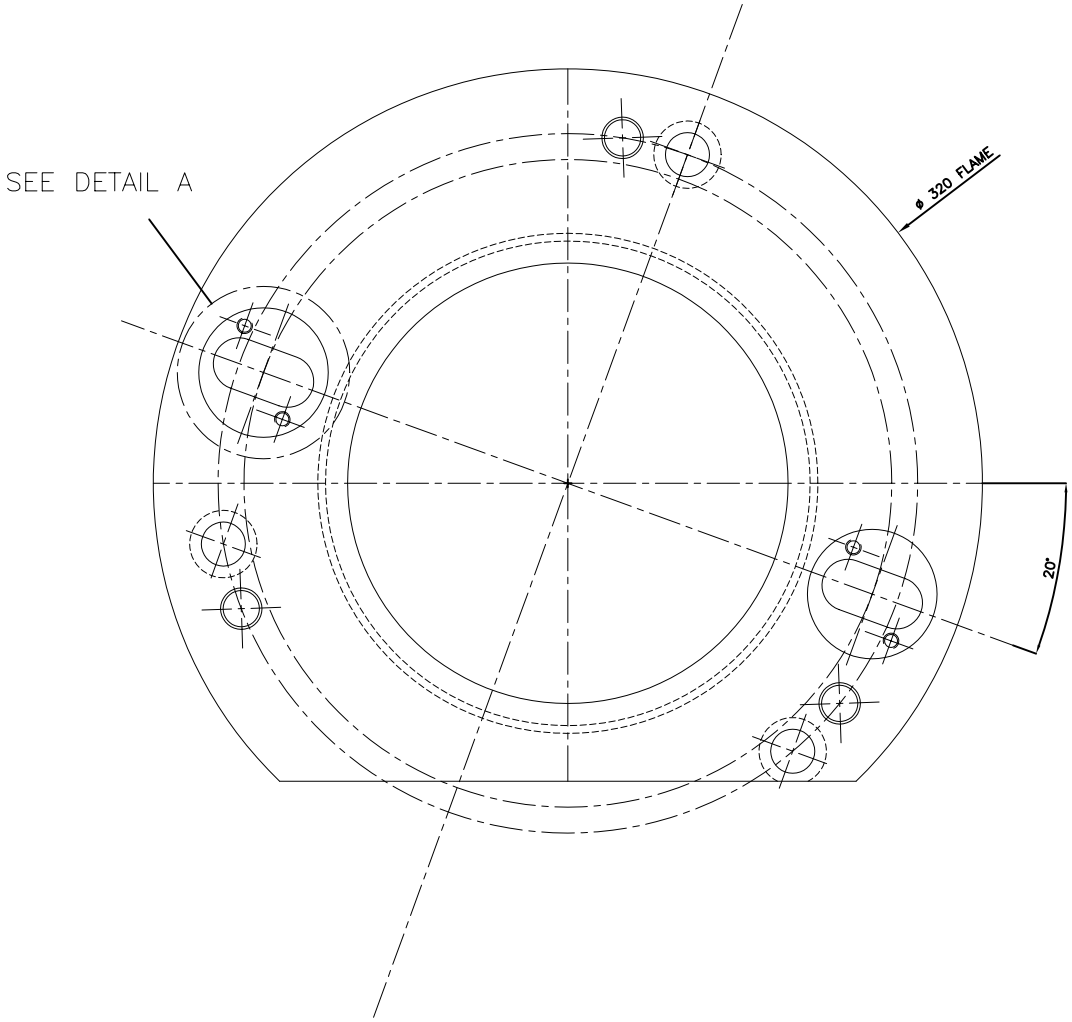
TITLE	MOD.	NUMBER	VERS.
MOUNTING RING CUTTING 20° RIGHT ASSY	CNC	9E01654	0

VESUVIUS GROUP S.A.
Rue de Douvrain, 17
B-7011 GHLIN
BELGIQUE

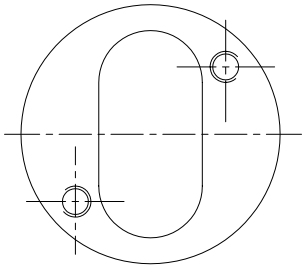
Vesuvius Systems Ghlin | Item's part List | BOM Level: Level 0

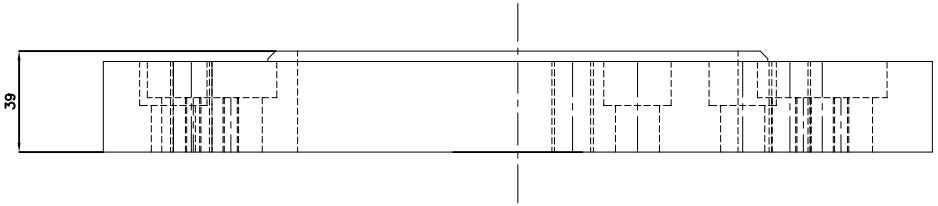
9E01654	**9E01654**	**MOUNTING RING CUTTING 20° RIGH**	**A1**

Level	Items	DWG Nbr	Type	Marker	Description	Quantity	Unit	Format
0	9E01538	9E01538 - 00	Item	1	MOUNTING RING CUTTING 20° RIG	1,00	PC	A1
0	0741600	0741600 -	Item	2	SCREW DIN912 M06X16	4,00	PC	A4
0	9A13017	9A13017 - 00	Item	3	WEARING WASHER	2,00	PC	A3



DETAIL A:
SCALE 2/1





ITEM	DESIGNATION	NUMBER	QTY.	Name / Number	WEIGHT
				MATERIAL	

Nominal dim. Above mm:	until mm:	Linear tol. mm:
–	6	±0.2
6	30	±0.5
30	120	±0.8
120	315	±1.2
315	1000	±2.0
1000	2000	±3.0
2000	4000	±4.0

UNLESS OTHERWISE SPECIFIED

Angular tol : Undimensioned radii : All sharp corners to be chamfered.

MACHINING	
MATERIAL	St52.3
WEIGHT	
DRAWN	23/11/2006 NAL
APPROVED FOR MANUFACTURING	24/11/2006 EPE
SCALE:	1/1

VESUVIUS

TRACABILITY PUR 34
– Markings must be easily readable
– Mark Vesuvius logo + Supplier initials ex. : (DD)

NOTE 1 DETAIL
– Part number + Revision (BB)
– PO + initial of TIF (CC) + Machining PO number (XXXXXX)

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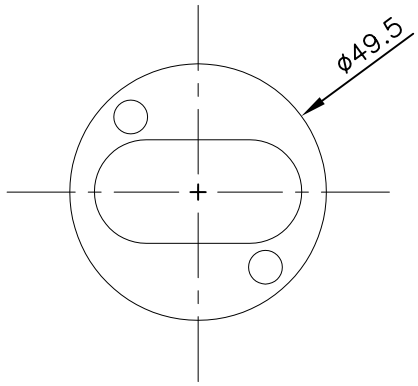
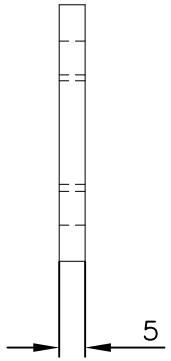
TITLE	MOD.	NUMBER	VERS.
MOUNTING RING CUTTING 20° RIGHT	CNC	9E01538	0





ITEM	MOD.	DESIGNATION	NUMBER

Name	Number	Qty.	Assy.	Mach.
MATERIAL			QUANTITY	

Nominal dim. Above mm:	until mm:	Linear tol. mm:
–	6	±0.2
6	30	±0.5
30	120	±0.8
120	315	±1.2
315	1000	±2.0
1000	2000	±3.0
2000	4000	±4.0

UNLESS OTHERWISE SPECIFIED

Angular tol : Undimensioned
radii : All sharp corners to be chamfered.

	DATE	BY
DRAWN	08/10/96	MDR
CHECKED		
APPROVED FOR MANUFACTURING	08/10/96	FNR
PROJECT Nr	MACHINING	

VESUVIUS INTERNATIONAL

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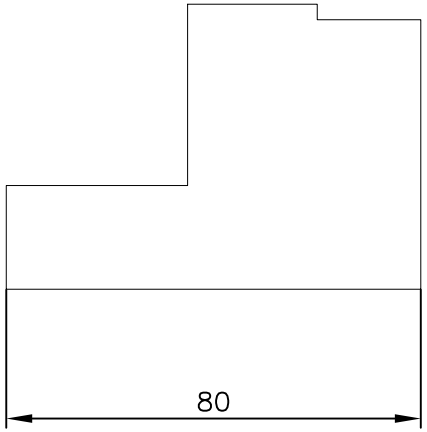
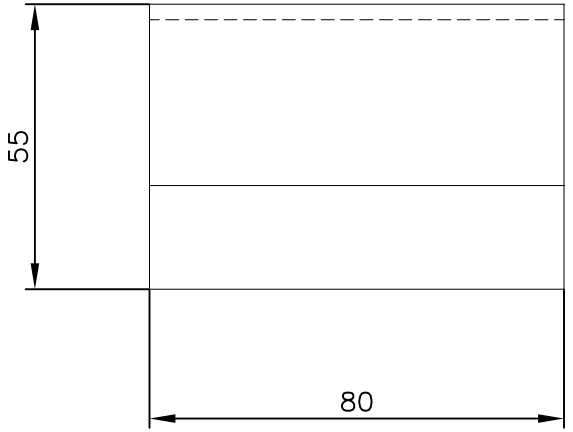
SCALE: 1/1

DATE					
QUANTITY					
ZONE					
VERSION	5	4	3	2	1

TITLE	MOD.	NUMBER	VERS.
WEARING WASHER	CNC	9A13017	00





				St37			
ITEM	DESIGNATION		NUMBER	QTY.	Name	Number	WEIGHT
					MATERIAL		

Nominal dim. Above mm:	until mm:	Linear tol. mm:
–	6	±0.2
6	30	±0.5
30	120	±0.8
120	315	±1.2
315	1000	±2.0
1000	2000	±3.0
2000	4000	±4.0

UNLESS OTHERWISE SPECIFIED

Angular tol : Undimensioned
radii : All sharp corners to be chamfered.

	DATE	BY
DRAWN	24/01/1996	LGB
CHECKED		
APPROVED FOR MANUFACTURING	9/09/2005	MDR
PROJECT Nr	MACHINING	

VESUVIUS

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outside our company without written permission.
This drawing must be returned after use.

SCALE: 1 / 1

TRACABILITY PUR 34
– Markings must be easily readable
– Mark Vesuvius logo + Supplier Initials ex. : (DD)

9/09/2005		DATE
DHE		DRAWN
EPE		CHECKED
①		VERSION

TITLE	MOD.	NUMBER	VERS.
SUPPORT BLOCK	CNC	0009679	01

VESUVIUS®
SYSTEMS

CALIBRATED NOZZLE CHANGER

CUSTOMER FILE

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VESUVIUS GROUP S.A.
Rue de Douvrain, 17
B-7011 GHLIN
BELGIQUE

Vesuvius Systems Ghlin | Item's part List | BOM Level: Level 0

	9D11621	**9D11621**	**HYDRAULIC CABINET SET**				**PL**

Level	Items	DWG Nbr	Type	Marker	Description	Quantity	Unit	Format
0	9D11639	9D11639 - 00	BOM	1	HYDR. CABINET TUNDISH CAR 1	1,00	PC	PL
0	9D11647	9D11647 - 00	BOM	2	HYDR. CABINET TUNDISH CAR 2	1,00	PC	PL

VESUVIUS GROUP S.A.
Rue de Douvrain, 17
B-7011 GHLIN
BELGIQUE

Vesuvius Systems Ghlin | Item's part List | BOM Level: Level 0

	9D11639	**9D11639**	**HYDR. CABINET TUNDISH CAR 1**					**PL**
Level	Items	DWG Nbr	Type	Marker	Description	Quantity	Unit	Format
0	9E00468	9E00468 - 01	Item	1	HYDRAULIC CABINET CNC	1,00	PC	A1
0	9D11613	9D11613 - 00	Item	2	HYDRAULIC JUNCTION BOX PR61113	1,00	PC	PL

VESUVIUS GROUP S.A.
Rue de Douvrain, 17
B-7011 GHLIN
BELGIQUE

Vesuvius Systems Ghlin | Item's part List | BOM Level: Level 0

	9D11647	**9D11647**	**HYDR. CABINET TUNDISH CAR 2**				**PL**

Level	Items	DWG Nbr	Type	Marker	Description	Quantity	Unit	Format
0	9E00468	9E00468 - 01	Item	1	HYDRAULIC CABINET CNC	1,00	PC	A1
0	9D11605	9D11605 - 00	Item	2	HYDRAULIC JUNCTION BOX PR61113	1,00	PC	PL

VESUVIUS®
SYSTEMS

CALIBRATED NOZZLE CHANGER

CUSTOMER FILE

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VESUVIUS GROUP S.A.
Rue de Douvrain, 17
B-7011 GHLIN
BELGIQUE

Vesuvius Systems Ghlin | Item's part List | BOM Level: Level 0

	9D11621	**9D11621**	**HYDRAULIC CABINET SET**				**PL**

Level	Items	DWG Nbr	Type	Marker	Description	Quantity	Unit	Format
0	9D11639	9D11639 - 00	BOM	1	HYDR. CABINET TUNDISH CAR 1	1,00	PC	PL
0	9D11647	9D11647 - 00	BOM	2	HYDR. CABINET TUNDISH CAR 2	1,00	PC	PL

VESUVIUS GROUP S.A.
Rue de Douvrain, 17
B-7011 GHLIN
BELGIQUE

Vesuvius Systems Ghlin | Item's part List | BOM Level: Level 0

	9D11639	**9D11639**	**HYDR. CABINET TUNDISH CAR 1**					**PL**
Level	Items	DWG Nbr	Type	Marker	Description	Quantity	Unit	Format
0	9E00468	9E00468 - 01	Item	1	HYDRAULIC CABINET CNC	1,00	PC	A1
0	9D11613	9D11613 - 00	Item	2	HYDRAULIC JUNCTION BOX PR61113	1,00	PC	PL

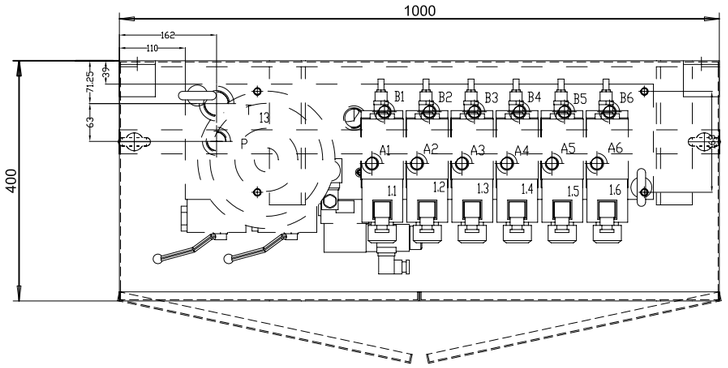
VESUVIUS GROUP S.A.
Rue de Douvrain, 17
B-7011 GHLIN
BELGIQUE

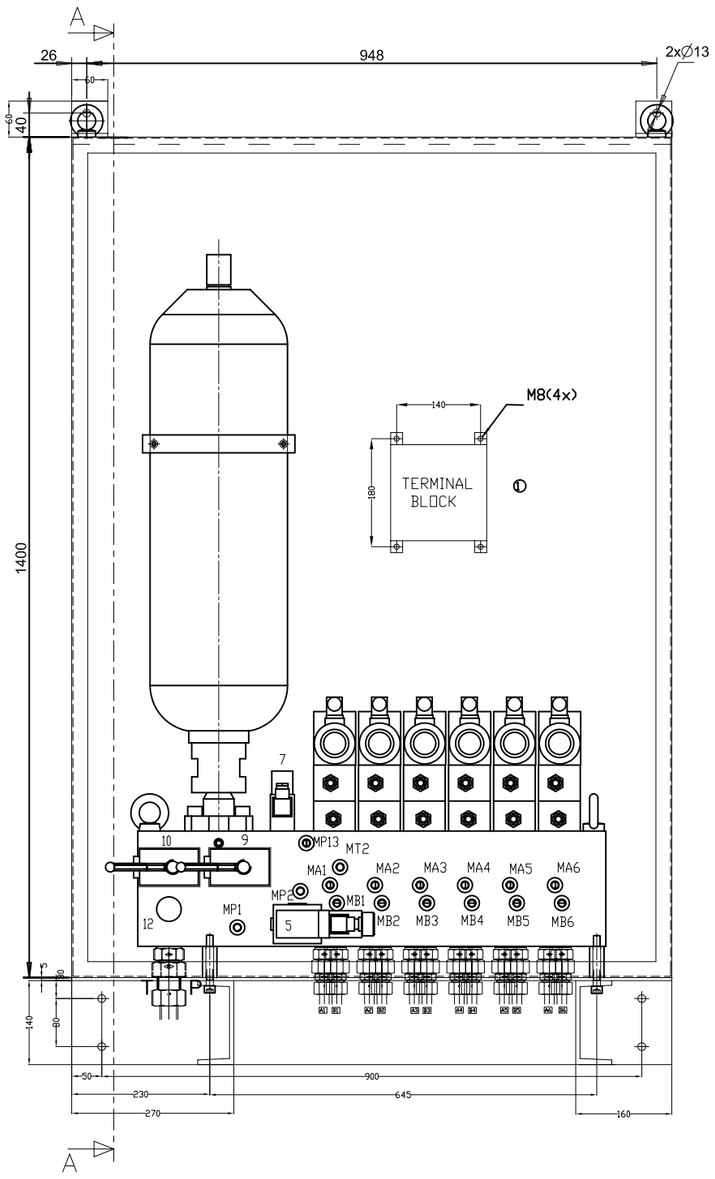
Vesuvius Systems Ghlin | Item's part List | BOM Level: Level 0

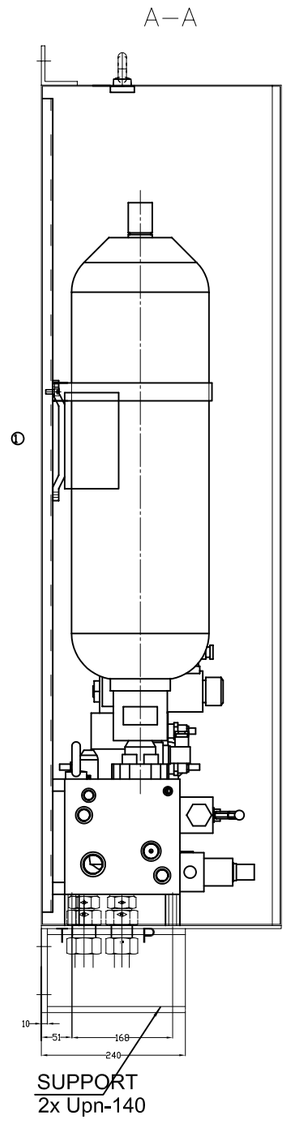
	9D11647	**9D11647**	**HYDR. CABINET TUNDISH CAR 2**				**PL**

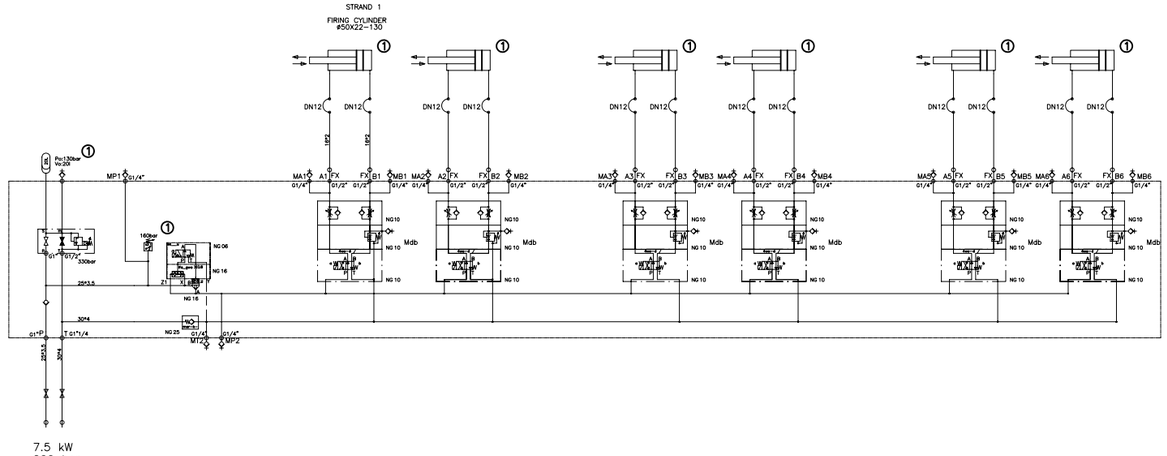
Level	Items	DWG Nbr	Type	Marker	Description	Quantity	Unit	Format
0	9E00468	9E00468 - 01	Item	1	HYDRAULIC CABINET CNC	1,00	PC	A1
0	9D11605	9D11605 - 00	Item	2	HYDRAULIC JUNCTION BOX PR61113	1,00	PC	PL

TOP VIEW









NOTES:
TERMINAL BLOCKS: SEE ELECTRIC DIAGRAMS FOR ITEM NUMBERS.

ITEM	DESIGNATION	NUMBER	QTY.		SUPPLY BY
	VESUVIUS		PROJECT Nbr		
			DRAWN	28/02/2007	NAL
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				SCALE: 1/5	

TITLE	MOD.	NUMBER	VERS.
HYDRAULIC CABINET CNC	CNC	9E00468	2

Item	Qty	Denomination	Code	Manufactured	Vesuvius ref.
01	1	4/2–DIRECTIONAL CONTROL	DG4V–5–2AJ–MUH620	VICKERS	9D13490
02	1	PRESSURE REDUCING VALVE	DMVZ–10S–A–02–C–35	IMAV	9D13493
03	1	FLOW CONTROL VALVE	DGMFN–5–X–A2W–B2W–30	VICKERS	9D13495
04	1	CONTROL CARTRIDGE	LC16A10E7X/V	REXROTH	1795900
05	1	CONTROL COVER	LFA16GWA–7X/P12V	REXROTH	9D13496
06	1	CHECK VALVE	M–SR25KE05–1X/V	REXROTH	9A28452
07	1	PRESSURE SWITCH	HED80H–2X/350K14V	REXROTH	9D13499
08	1	DIRECTIONAL POPPET VALVE	EV DG3VP–3–102AV–MUH10	VICKERS	9D13488
09	1	BALL VALVE	L06025	RÖTELMANN	– – – –
10	1	BALL VALVE	L06025	RÖTELMANN	– – – –
11	1	PRESSURE RELIEF VALVE	0532002014	BOSCH	9D13489
12	1	CHECK VALVE CARTRIDGE	M–SR20KE05–1X/V	REXROTH	9D13497
13	1	ACCUMULATOR	SB330–2DA1/112U–330	HYDAC	9B44662
14	1	MANIFOLD	H4670–1	VERMEULEN	– – – –

ITEM	DESIGNATION	NUMBER	QTY.		SUPPLY BY
VESUVIUS			PROJECT Nbr		
			DRAWN	28/02/2007	NAL
This drawing is the property of VESUVIUS and must not be copied or disclosed outside our company without written permission. This drawing must be returned after use.			APPROVED FOR MANUFACTURING	28/02/2007	EPE
				SCALE: 1/5	
TITLE			MOD.	NUMBER	VERS.
HYDRAULIC CABINET CNC			CNC	9E00468	2

VESUVIUS GROUP S.A.
Rue de Douvrain, 17
B-7011 GHLIN
BELGIQUE

Vesuvius Systems Ghlin | Item's part List | BOM Level: Level 0

	9D11407	**9D11407**	**SET OF FITTINGS & COUPLINGS**				**PL**

Level	Items	DWG Nbr	Type	Marker	Description	Quantity	Unit	Format
0	0003909	0003909 -	Item	F1	UNION MALE GE 16-PS/R 3/4" G	12,00	PC	A4
0	1862800	1862800 -	Item	F2	UNION ELBOW ADJ O.R EW 16-PS	24,00	PC	A4
0	0005632	0005632 -	Item	F3	UNION MALE GE 30-PSR 1"1/4G	1,00	PC	A4
0	0005631	0005631 -	Item	F4	UNION MALE GE 25-PSR 1"G	1,00	PC	A4
0	1773400	1773400 -	Item	F5	UNION EQUAL G16-PS	12,00	PC	A4

VESUVIUS SYSTEMS

CALIBRATED NOZZLE CHANGER

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Vickers®

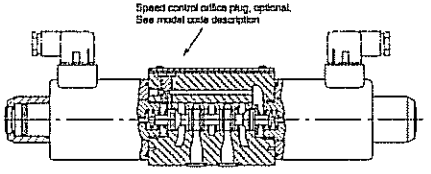
Directional Controls

EATON

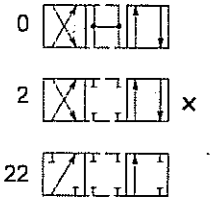
Wet Armature Solenoid Operated Directional Control Valves

Model DG4V-5, 20 Series

Typical Construction of a Spring-Centered DC Valve with Variable Speed Pilot Control passage



DG4V-5-*A valves



General Description

Max. pressure ..... 315 bar (4500 psi)
Max. flow rates ..... Up to 120 L/min (32 USgpm), dependant on spool
Mounting surface .... ISO 4401 size 05 NFPA D02 DIN 24340 (NG10)

A range of four-port solenoid operated directional control valves with four-land spool design to facilitate provision of smooth, variable valve response speeds.

The range includes:

- AC and DC wet-armature solenoid options with ISO 4400 (DIN 43650) electrical connections and manual overrides.
- Variable speed changeover potential in all DC models; see "Response Times" section
- Many spool types; in spring-offset, spring-centered and detented arrangements.

5089.00/EN/0497/A

A.1

VICKERS

Catalogue .....: VICKERS
Manufacturer name ....: VICKERS
Manufacturer reference : DG4V-5-2AJ-M-U-H6-20

Model Code

(F13-) DG4V-5-*** *(L) (J) (-**)- (V) M- (S6)- U - ** 6- 20- J**

[1] [2] [3] [4] [5] [6] [7] [8] [9] [10] [11]

[1] Prefix, fluid compatibility
Blank = AC or DC-voltage models for petroleum oils, water-in-oil (invert) emulsions or phosphate esters. AC-voltage models for water glycols.
F13 = DC-voltage models for water glycols.

[2] Spool type
See "Functional Symbols" section

[3] Spool spring arrangement
A = Spring-offset, end-to-end
AL = As "A" but left-hand build
B = Spring offset, end-to-center
BL = As "B" but left-hand build
C = Spring centered
N = Two-position, detented
See also "Functional Symbols" section

[4] Spool design
J = All DC valves except "0A" spool/spring arrangements. AC valves with "6B(L)" and "6C" spool/spring arrangements.
Omit for "0A" DC-valves and all AC valves except "6B(L)" and "6C" spool/spring arrangements

[5] Manual override option
P = Standard overrides in both ends of single-solenoid valves
H = Water-resistant override(s) in solenoid end(s)▼
H2 = Water-resistant overrides in both ends of single-solenoid valves
Z = No overrides at either end
Omit for standard plain override(s) in solenoid end(s) only▼
▼ *No override in non-solenoid end of single-solenoid valves.*

[6] Solenoid energization identity
V = Solenoid "A" is at port A end and/or solenoid "B" is at port B end, independent of spool type
Omit for US ANSI B93.9 standard requiring solenoid "A" to connect P to A when energized and/or solenoid "B" to connect P to B

[7] Spool position indicator switch
S6 - LVDT type DC switch with Pg7 connector plug

[8] Electrical connection(s)
U = ISO 4400 (DIN 43650) mounting(s) without plug(s)

[9] Coil rating
A = 110V AC 50
C = 220V AC 50
ED = 240V AC 50
EK = 115V AC 60
EH = 230V AC 60
G = 12V DC
H = 24V DC
HL = 24V DC (32W)
CJ = 48V DC
P = 110V DC

[10] Design number, 20 series
Subject to change. Installation dimensions unaltered for design numbers 20 to 29 inclusive

[11] Spool speed control
J06 = 0,6 mm orifice
J08 = 0,8 mm orifice
J10 = 1,0 mm orifice
J12 = 1,2 mm orifice
J99 = no orifice. Must be specified where future fitting of orifice is required, see page A.11, "Spool Speed Control Orifice"

For Mounting Subplates and Fixing Bolt Kits
See catalogs 2425 and 2314.

For Electrical Plug(s)
See end of "Installation Dimensions" section.

Operating Data

Max. Pressures
Ports P, A and B .... 315 bar (4500 psi)
Ports T_A and T_B .... 120 bar (1750 psi) for AC sol.
160 bar (2325 psi) for DC sol.

Control Data

For coil ratings see [6] in "Model Code" section.

Power Consumption

AC Solenoids

	AC 50 Hz	AC 60 Hz
Inrush, max. ▲VA	700	750
Steady-state ▼VA	375	440
Holding VA	105	130

All above values are RMS
▲ *Armature fully retracted, 1st half-cycle.*
▼ *At start of normal working stroke of valve spool. Previously called "inrush".*

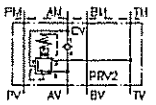
DC Solenoids
At rated voltage and wire temperature of 20°C (68°F):
Type HL 32W
Others 38-42W

Vesuvius Systems	Drawn	Date	BY
		27-2-2007	NAL
TITLE	MOD.	NUMBER	
DIRECT. VALVE DN20-4/2-(DG4V-5)	HY	9D13490	

3 way press. reg. valve CETOP 5 (sandwich plate) in A,pilot operat.

DMVZ-10.-A02./..

Symbol:

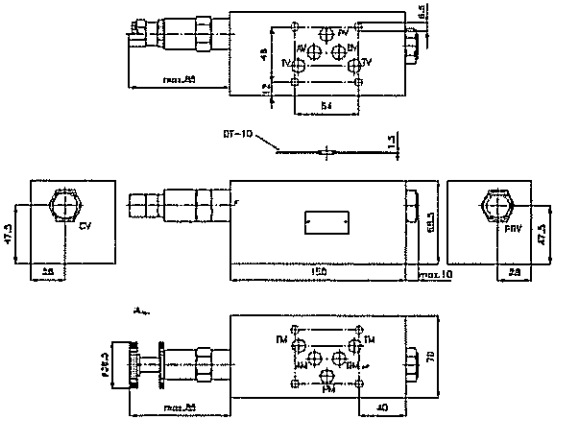


Nom. pressure:
350 bar

Nominal flow:
40 l/min.

IMAV-Hydraulik GmbH
Breite Strasse 10
D-40670 Meerbusch (Osterath)
Phone +49 (0)2159 - 9188.0
Fax +49 (0)2159 - 4242
E-mail: info@imav.com
Internet: http://www.imav.com

IZ-430-401-00
(Subject to change!)



3 way press. reg. valve CETOP 5 (sandwich plate) in A,pilot operat.

DMVZ-10.-A02./..

IMAV-Hydraulik GmbH
Breite Strasse 10
D-40670 Meerbusch (Osterath)
Phone +49 (0)2159 - 9188.0
Fax +49 (0)2159 - 4242
E-mail: info@imav.com
Internet: http://www.imav.com

IZ-430-401-00
(Subject to change!)

Ordering example:

DMVZ - 10A - A 02 C / 12
A B C D E F

Model code:

A **design**
pressure regulaton valve
adjustable
pilot operated
spool type valve
with mounting interface DIN 24340 form A
sandwichplate design

B **size and material**
10A = aluminum (F37)
X 10S = steel (9SMnPb28K resp. GGG-40)

C **function mode**
X A = in A acting

D **pressure reducing valve**
X 02 = PRV2-10.-.. (pilot operated) see data sheet no.: MP-210-101-00

E **adjustment**
X C = cap
K = handknob

F **pressure range (PRV2)**
03 = 3.4 - 21 bar
20 = 6.9 - 138 bar
X 35 = 17.2 - 241 bar

Technical Data:

nominal pressure:	250 bar (A) 350 bar (S)
nominal flow:	40 l/min
weight:	2. 2 / 5.6 kg (A/S)
pressure regulator valve:	PRV2-10.-.. see datasheet no. MP-210-101-00
included:	DT-10 = sealing plate with vulcanized O-ring (Viton FPM)

Catalogue .....: IMAV
Manufacturer name ....: IMAV
Manufacturer reference : DMVZ-10S-A02C/35

Vesuvius Systems	Drawn	Date	BY
		28-2-2007	NAL
TITLE	MOD.	NUMBER	
PRESSURE REDUCING VALVE DN10-(DMVZ-10)	HY	9D13493	

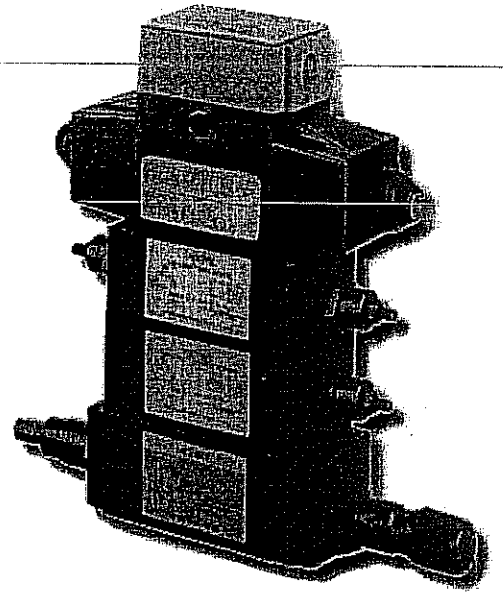
Vickers®

SystemStak™

EATON

SystemStak™ Valves

ISO 4401 -05 size, 315 bar (4500 psi) and 120 l/min (32 USgpm) maximum ratings
Pressure relief and reducing, sequence, counterbalance, and flow control functions



VICKERS
Revised 11/97

640

Catalogue .....: VICKERS
Manufacturer name ....: VICKERS
Manufacturer reference : DGMFN-5-X-A2W-B2W-30

General Description

These valves are adjustable, non-compensated flow restrictors. An integral check valve around the regulating orifice allows free flow in one direction and metered flow in the other.

Control is available in "A" only, "B" only, and "A" and "B" ports as an "X" type (meter-in) or "Y" type (meter-out).

The "P" port is available only in the "X" type (meter-in) and does not contain a reverse flow check.

The valve flow setting is adjustable by means of either a hex key adjusting screw and locknut, a hand-adjust knob, or a micrometer knob with keylock.

A normal or fine metering capability is available. See the pressure drop curves on page 26 for detailed performance difference.

Model Code

DGMFN - 5 * - * - * * * - B * * - 30
1 2 3 4 5 6 7 8 9 10

1 Valve function
Manifold or subplate mounted flow control valve.

2 Interface
✗ 5 - ISO 4401-AC-05-4-A, CETOP 5 Size 5 RP35H ANSI/NFPA D05
5N - NFPA D05 (Alt. A)
5P - NFPA D05 (Alt. B)

3 Direction of flow
✗ X - Meter-in
Y - Meter-out

4 Port operated upon
✗ A - Cylinder port "A" (single or dual type)
B - Cylinder port "B" (single type only)
P - Pressure port (single type only)

5 Adjustment range
1 - Fine control
✗ 2 - Normal control

6 Adjustment device
H - Knob adjuster
K - Micrometer knob with keylock
✗ W - Screw with locknut

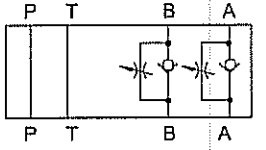
7 Port operated upon: second function
(Omit for single flow control models.)
B - B cylinder port (Dual type)

8 Adjustment range: second function
(Omit for single flow control models.)
1 - Fine control
✗ 2 - Normal control

9 Adjustment device: second function
(Omit for single flow control models.)
H - Knob adjuster
K - Micrometer knob with keylock
✗ W - Screw with locknu

10 Design number - 30 series
Subject to change. Installation dimensions unaltered for design numbers 30 to 39 inclusive.

DGMFN-5-X-A**-B**-30



Vesuvius Systems	Drawn	Date	BY
		28-2-2007	NAL
TITLE	MOD.	NUMBER	
FLOW CONTROL VALVE DN30-(DGMFN)	HY	9D13495	

Spécifications de commande pour valve à encastrer (sans couvercle)

LC | | | | | / | *

calibres 16 à 63

calibre 16	série 6X	= 16
calibre 25		= 25
calibre 32		= 32
calibre 40		= 40
calibre 50		= 50
calibre 63		= 63

calibres 80 à 160

calibre 80	série 5X	= 80
calibre 100		= 100
calibre 125	série 2X	= 125 *)
calibre 160		= 160 *)

rapport de section 2:1 (≙ section annulaire = 50 %) = A
rapport de section 14,3:1 (≙ section annulaire = 7 %) = B

pression d'ouverture env. 0 bar (sans ressort) = 00
pression d'ouverture env. 0,5 bar = 05
pression d'ouverture env. 1,0 bar **) = 10
pression d'ouverture env. 2,0 bar = 20
pression d'ouverture env. 3,0 bar (seulement pour cal. 125) = 30
pression d'ouverture env. 4,0 bar ***) = 40
(valeurs exactes, voir page 4)

E = clapet de valve sans prolongation d'amortissement
D = clapet de valve avec prolongation d'amortissement

6X = cal. 16...63 série 60 à 69 (60 à 69 ≙ cotes de montage et de raccordement inchangées)

5X = cal. 80, 100 série 50 à 59 (50 à 59 ≙ cotes de montage et de raccordement inchangées)

2X = cal. 125, 160 série 20 à 29 (20 à 29 ≙ cotes de montage et de raccordement inchangées)

V = joints FPM (Viton) pour ester phosphate (HFD-R)

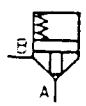
sans dés. = joints NBR pour huile minérale selon DIN 51 524 (HL, HLP)

autres indications en clair

*) cal. 125 et 160 non livrables en exécution LC..B..D20/..
**) non livrable en cal. 160
***) non livrable en cal. 125 et 160

Symboles des valves à encastrer (exécution, voir spécifications de commande)

Sans prolongation d'amortissement



rapport de section 2:1 = ...A..E../...

Caractéristiques (pour toute utilisation des appareils en dehors de ces caractéristiques, veuillez nous consulter)

Fluide		huile minérale selon DIN 51 524 (HL-HLP) ester phosphate (HFD-R)
Plage de température du fluide	°C	– 20 ... + 70
Plage de viscosité	mm²/s	2,8 ... 380
Pression de service aux orifices A, B, X, Z1 et Z2	bar	... 315 (couvercle avec distributeur à tiroir monté; couvercle avec distributeur à clapet monté en exécution "315 bar")
	bar	... 420 (couvercle sans montage de distributeur à tiroir; couvercle avec distributeur à clapet monté en exécution "630 bar")

MANUFACTURER : MANNESMANN - REXROTH
CATALOG : NAME : "
YEAR : 1992
PAGE : /
REF : LC 16A 10 E 6X/V

FAMILY : DISTRIBUTEUR
MEASURING UNIT : PIECE

VESUVIUS INTERNATIONAL

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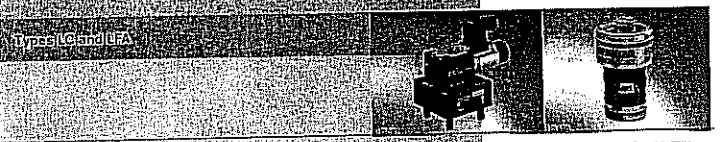
	DATE	BY
DRAWN	4/2/93	LR

TITLE	MOD.	NUMBER
CONTROL CARTRIDGE	SEM 85	1795900

2-way cartridge valves
Directional functions
Cartridge valves and control covers

Types LC and LFA

RE 21010/03.05 1/68
Replaces: 02.03



Sizes 16 to 160
Component series 2X; 6X; 7X
Maximum operating pressure 420 bar
Maximum flow 25000 l/min

Type LC 25 WEA-7X/...
with electrical position monitoring type 4WE6
(WK 32 plug and cable socket

Cartridge valve type LC 25 A40E7X/...

General notes on the ordering code for control covers

Nozzle symbol		Symbol in the ordering code	
A**		A**	

This nozzle is designed as screw-in nozzle. If a nozzle is to be installed, the relevant code letter must be entered in the type designation together with the nozzle Ø in 1/10 mm.
Example: A12 = nozzle with Ø1.2 mm in channel A.

Nozzle symbol		Symbol in the ordering code
Ø1,2		

This nozzle is designed as a drilling; no entries are required in the type designation. (Nozzle Ø in mm)

Nozzle symbol		Symbol in the ordering code
Z12		

This nozzle is designed as threaded nozzle. It is a standard nozzle, for which no entries are required in the type designation. (Nozzle Ø in 1/10 mm)

For pilot control valves, see page 161

Preferred types

Type LFA (control cover)	Material number
LFA 16 D-7X/F	R900912625
LFA 16 H2-7X/F	R900912655
LFA 16 WEA-7X/	R900910271
LFA 16 GWA-7X/	R900912636
LFA 16 E-7X/CA40DOMG24F	R900912619
LFA 25 D-7X/F	R900905302
LFA 25 H2-7X/F	R900912694
LFA 25 WEA-7X/	R900910273
LFA 25 GWA-7X/	R900912675
LFA 25 E-7X/CA40DOMG24F	R900912670
LFA 32 D-7X/F	R900905303
LFA 32 H2-7X/F	R900912728
LFA 32 WEA-7X/	R900912712
LFA 32 GWA-7X/	R900912708
LFA 32 E-7X/CA40DOMG24F	R900912703

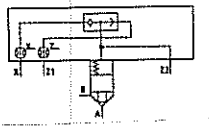
Type LFA (control cover)	Material number
LFA 40 D-7X/F	R900938073
LFA 40 H2-7X/F	R900938122
LFA 40 WEA-7X/	R900931581
LFA 40 GWA-7X/	R900938114
LFA 40 E-7X/CA40DOMG24F	R900938107
LFA 50 D-7X/F	R900938160
LFA 50 H2-7X/F	R900938205
LFA 50 WEA-7X/	R900938215
LFA 50 GWA-7X/	R900938200
LFA 50 E-7X/CA40DOMG24F	R900938197
LFA 63 D-7X/F	R900938225
LFA 63 H2-7X/F	R900938250
LFA 63 WEA-7X/	R900938257
LFA 63 GWA-7X/	R900938245
LFA 63 E-7X/CA40DOMG24F	R900938242

Catalogue .....: REXROTH
Manufacturer name ....: REXROTH
Manufacturer reference : LFA16G-7X/P 12V

Symbols (basic symbols)

The symbols used in the description of types below are binding!

LFA . G-../...
Control cover with integrated shuttle valve
Sizes 16 to 160
Pages 22 and 23



General notes on the ordering code for control covers

x = available
• = on enquiry

1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17
LFA			–	[1]	/	[2]	[3]	[4]								

Size										Type	Component series	Area ratio	Cracking pressure	Damping	El. monitor for closed position	Remote control port	Nozzles in channel [5]						Seal material
16	25	32	40	50	63	80	100	125	160								A	B	F	T	X	F	Z1	
x	x	x	x	x	x						7X													
						x	x				6X													
								x	x		2X													
x	x	x	x	x	x	x	x	x	x	D				D		F								
x	x	x	x	x	x	x	x	x	x	H1				D		F								
x	x	x	x	x	x	x	x	x	x	H2				D		F								
x	x	x	x							H3				D		F								
x	x	x	x	x	x	x	x	x	x	H4				D		F								
x	x	x	x	x	x	x	x	x	x	G				D										
x	x	x	x	x	x	x	x	x	x	R				D										
x	x	x	x	x	x	x	x	x	x	RF				D										
						x	x			R2				D										
x	x	x	x	x	x	x	x			WEA				D										
x	x	x	x	x	x	x	x			WEB				D										
x	x	x	x	x	x	x	x			WEMA				D										
x	x	x	x	x	x					WEAB				D										
x	x	x	x	x	x					WEMB				D										
x	x	x	x	x	x					WEBB				D										
x	x	x	x	x	x					WECA				D										
x	x	x	x	x	x	x	x			WEA9				D										
x	x	x	x	x	x	x	x			GWA				D										
x	x	x	x	x	x	x	x			GWB				D										
x	x	x	x	x	x	x	x			KWA				D										
x	x	x	x	x	x	x	x			KWB				D										
x	x	x	x	x	x					E		x	x	D		QMG24	F							
x	x	x	x	x	x					EH2		x	x	D		QMG24	F							
x	x	x	x	x	x					EWA		x	x	D		QMG24								
x	x	x	x	x	x					EWB		x	x	D		QMG24								

The ordering code can be found on the relevant pages of the individual control cover variants

[1] 7X = component series 70 to 79,
5X = component series 60 to 69 and
2X = component series 20 to 29: (unchanged installation and connection dimensions)

[2] CA = 2 : 1 (area ratio A1:A2)
CB = 14.3 : 1 (area ratio A1:A2)
CD = 0 %
For the control cover with electrical monitor of the closed position (including position switch), the type designation includes the version of the control cover and the cartridge valve).

[3] 10 = 1.0 bar cracking pressure
20 = 2.0 bar cracking pressure
40 = 4.0 bar cracking pressure

[4] D = valve poppet of the cartridge with damping nose

[5] Order of nozzles for the purchase order and representation in symbols and circuit diagrams.
Further details can be found on the relevant pages of the individual control cover variants and on page 14 (nozzle characteristic curves).

Vesuvius Systems	Drawn	Date	BY
		28-2-2007	NAL
TITLE	MOD.	NUMBER	
CARTRIDGE VALVE DN16-(LFA16GWA)	HY	9D13496	

MANNESMANN REXROTH

Check valve cartridge Type M-SR, Series 1X

RE 20 380/10.95

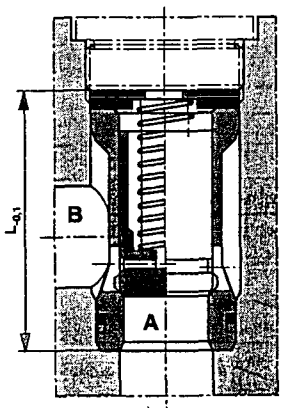
Replaces: 04.92

Sizes 6 to 30 | up to 315 bar | up to 400 L/min

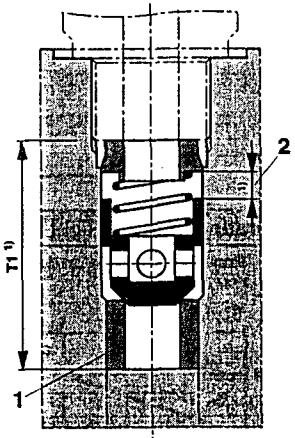
Characteristics:

- For installation in manifold blocks
  - as right angled check valve cartridge
  - as straight line check valve cartridge
- Leakfree closure in one direction
- Various opening pressures, optional (see ordering code)

Size	$L_{-0,1}$
8	36,3
10	39,3
15	45,8
20	55,3
25	74,3
30	83,3



Right angled check valve cartridge



Straight line check valve cartridge

1 Seat shrunk with –60 °C
2 Stroke
1) Dimensions see page 4 below

Symbols

(with spring) (without spring)

Ordering code

M-SR | | –1X/ | *

Check valve = M-SR

Size 6 (not with right angled check valve)	= 6
Size 8	= 8
Size 10	= 10
Size 15	= 15
Size 20	= 20
Size 25	= 25
Size 30	= 30
Right angled check valve cartridge	= KE
Straight line check valve cartridge	= KD

* Further details in clear text

no code = NBR seals
V = (only with right angled check valve) viton seals (other seals on request)

⚠ Warning! Observe sealing suitability of pressure fluid used!

1X = Series 10 to 19 (10 to 19: unchanged installation and connection dimensions)

Opening pressure see operating curves:
00 = without spring (not with straight line check valve)
02 =
05 = (standard)
15 =
30 =
50 =

Order no.– Seal kits ("KE")

	NBR-seals	FPM seals
Size 8	313943	313944
Size 10	313945	313946
Size 15	313947	313948
Size 20	313959	313960
Size 25	313806	313807
Size 30	313810	313811

Technical data (For applications outside these parameters please consult us!)

Weight		Size 6	Size 8	Size 10	Size 15	Size 20	Size 25	Size 30
• Right angled check valve cartridge	kg	–	0,03	0,05	0,08	0,14	0,32	0,47
• Straight line check valve cartridge	kg	0,05	0,05	0,05	0,1	0,2	0,25	0,3

MANNESMANN REXROTH

CONTROLLED BY ENGINEERING

SUPPLIER NAME : REXROTH

SUPPLIER REF : M-SR 25 KE05-1X/V

MANUFACTURER : REXROTH
CATALOG : NAME :
YEAR :
PAGE :
REF : M-SR 25 KE05-1X/V
GROUPE : MECANIQUE
FAMILY : VANNE
MESURING UNIT : PC

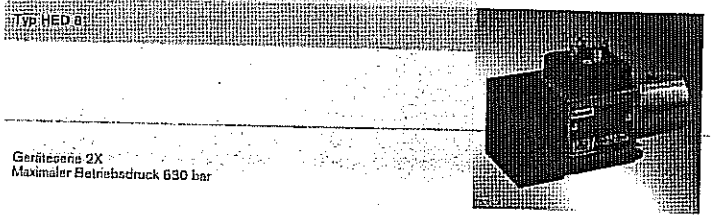
VESUVIUS FCAD GHLIN	Drawn	Date	BY
		25/09/97	FBA
TITLE	MOD.	NUMBER	
CHECK-VALVE CARTRIDGE		9A28452	

Electric Drives and Controls | Hydraulics | Linear Motion and Assembly Technologies | Pneumatics | Service

Rexroth
Bosch Group

Hydro-elektrischer Druckschalter

RD 50061/02.06 1/16
Ersetzt: 50060



Geräteserie 2X
Maximaler Betriebsdruck 630 bar

Inhaltsübersicht

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Vorzugstypen	2
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Informationen zu lieferbaren Ersatzteilen:
www.boschrexroth.com/spc

Merkmale

- für Plattenaufbau
- für Rohrleitungseinbau
- für Flanschanschluss, Lage der Anschlüsse nach ISO 16873
- als Höhenverkettungselement, Lage der Anschlüsse nach DIN 24340 Form A
- in Längsverkettungen
- 5 Druckstufen, wahlweise
- 4 Verstellelemente, wahlweise:
  - Spindel mit Innensechskant, mit oder ohne Schutzkappe (Schutzkappe verplombbar)
  - Spindel mit Innensechskant und Skala, mit oder ohne Schutzkappe
  - Drehknopf mit Skala
  - abschließbarer Drehknopf mit Skala
- Leitungsdose mit Beschaltung (Leuchtanzeige) (separate Bestellung)

Bestellangaben

HED 8 | – | 2X | / | K14 | | | .

Kolben-Druckschalter
Flanschanschluss (ISO 16873)[1] = OH
Plattenaufbau = OP
Rohrleitungseinbau = OA

Geräteserie 20 bis 29 = 2X
(20 bis 29: unveränderte Einbau- und Anschlussmaße)

Maximaler Einstelldruck 50 bar = 50
Maximaler Einstelldruck 100 bar = 100
Maximaler Einstelldruck 200 bar = 200
Maximaler Einstelldruck 350 bar = 350
Maximaler Einstelldruck 630 bar [2] = 630

elektrischer Anschluss
ohne Leitungsdose = K14 [3]
Einzelanschluss mit Gerätestecker nach DIN EN 175301-803

weitere Angaben im Klartext

Dichtungswerkstoff
ohne Bez. = NBR-Dichtungen
V = FKM-Dichtungen
(andere Dichtungen auf Anfrage)
⚠ Achtung!
Dichtungstauglichkeit der verwendeten Druckflüssigkeit beachten!

ohne Bez. = Spindel ohne Skala, ohne Schutzkappe
S = Spindel ohne Skala, mit Schutzkappe
A [4] = Spindel mit Skala, ohne Schutzkappe
AS [4] = Spindel mit Skala, mit Schutzkappe
KS [4] [5] = abschließbarer Drehknopf mit Skala
KW [5] = Drehknopf mit Skala

[1] Zwischenplatte für Höhenverkettung, separate Bestellung, siehe Seiten 11 bis 14
[2] nicht für Höhenverkettung zulässig
[3] Leitungsdosen, separate Bestellung, siehe Seite 4
[4] H-Schlüssel, Material-Nr. R900008158, ist im Lieferumfang enthalten
[5] die exakte Einstellung des Schaltdruckes ist nur mit einem Manometer möglich (Skala dient nur zur Orientierung)

Vorzugstypen

Typ	Material-Nr.
HED 8 OP-2X/100K14	R901102747
HED 8 OP-2X/200K14	R901102721
HED 8 OP-2X/350K14S	R901102385
HED 8 OA-2X/050K14	R901101698
HED 8 OA-2X/50K14S	R901102704
HED 8 OA-2X/50K14KS	R901102702
HED 8 OA-2X/50K14KW	R901102754
HED 8 OA-2X/100K14	R901102706
HED 8 OA-2X/100K14S	R901102711
HED 8 OA-2X/100K14KW	R901094159
HED 8 OA-2X/200K14	R901102708
HED 8 OA-2X/200K14S	R901102727
HED 8 OA-2X/350K14	R901102710
HED 8 OA-2X/350K14S	R901102778
HED 8 OA-2X/350K14AS	R901102722
HED 8 OA-2X/350K14KW	R901102715

Typ	Material-Nr.
HED 8 OH-2X/50K14	R901102349
HED 8 OH-2X/50K14V	R901099796
HED 8 OH-2X/50K14S	R901102712
HED 8 OH-2X/50K14AV	R901099798
HED 8 OH-2X/50K14KS	R901102356
HED 8 OH-2X/50K14KSV	R901099800
HED 8 OH-2X/100K14	R901102360
HED 8 OH-2X/100K14V	R901099775
HED 8 OH-2X/100K14S	R901095375
HED 8 OH-2X/100K14AV	R901099780
HED 8 OH-2X/100K14KSV	R901099788
HED 8 OH-2X/200K14	R901099805
HED 8 OH-2X/200K14V	R901099789
HED 8 OH-2X/200K14S	R901102362
HED 8 OH-2X/200K14AV	R901099790
HED 8 OH-2X/350K14V	R901099815
HED 8 OH-2X/350K14S	R901102713

Weitere Vorzugstypen und Standardgeräte sind in der EPS (Standard Preisliste) ausgewiesen.

Catalogue .....: REXROTH
Manufacturer name ....: REXROTH
Manufacturer reference : HED8 OH-2X/350 K14 V

Vesuvius Systems	Drawn	Date	BY
		28-2-2007	NAL
TITLE	MOD.	NUMBER	
PRESSURE SWITCH HED8-350bar-24V	HY	9D13499	

VICKERS®

Directional Controls

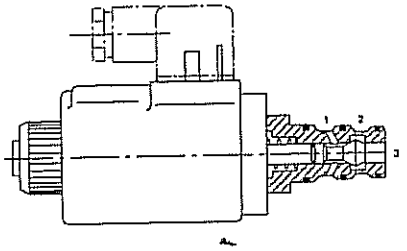
EATON

Solenoid Operated Poppet-Type Directional Control Valves

Cartridge Models CVUA-6-PD

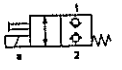
X Gasket Mounted Models DG3/4VP-3

Construction of a Typical
3 Way/2 Position Cartridge Type
Valve, Model CVUA-6-PDN-3-M-U

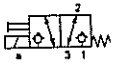


Functional Symbols

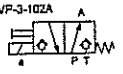
CVUA-6-PD*-2



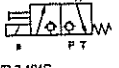
CVUA-6-PD*-3



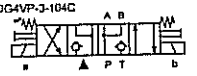
X DG3VP-3-102A



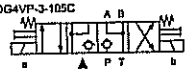
DG3VP-3-103A



DG4VP-3-104C



DG4VP-3-105C



▲ *This spool position is achieved only when both solenoids are energized simultaneously and remain so.*

Note: ◇ No leakage in either direction

↕ Through flow in both directions

GB-042A

Basic Characteristics

Max. pressure ..... 315 bar (4500 psi)
Max. flow rates ..... Up to 20 L/min (32 USgpm)

Mounting surface for DG*VP models ..... ISO 4401 size 03
NFPA D01
DIN 24340 (NG6)

General Description

These new solenoid operated poppet valves are used mainly for starting, stopping and controlling the direction of linear and rotary actuators or for use as a pilot valve. The gasket mounted types can also be used for controlling the pilot functions of cartridge valves to ISO 7368 (DIN 24342) (see catalog 2378).

All valves are of a "zero leakage design" which is the major design feature of poppet-type valves. The valves are available as either gasket mounted or cartridge insert type. The latter requires a housing having a purpose-formed recess (see recess hole drawing and special tool note).

Advantages

- Zero internal leakage in closed position
- Fast consistent response times
- Cost-efficient high pressure capability
- Simple assembly and installation
- Fast and easy servicing

VICKERS

A.1

Model Codes

For CVUA Cartridge Valves

(F3-)CVUA-6-PD * - * -M-U-* -1*

[1] [4] [5] [6] [7]

For DG*VP Valves

(F3-)DG * VP-3-10** -VM-U-* -1*

[1] [2] [3] [6] [7]

[1] Prefix, fluid compatibility
Blank = For petroleum oils, water glycols and invert emulsions
F3 = For phosphate esters, petroleum oils, water glycols and invert emulsions

[2] Function
3 = Three-way
4 = Four-way

[3] Spool and spring arrangement
102A = Normally open, spring offset; option for DG3VP models
103A = Normally closed, spring offset; option for DG3VP models
104C = Normally open, spring centered; option for DG4VP models
105C = Normally closed, spring centered; option for DG4VP models

[4] Mounting flange type
N = Narrow thickness flange
W = Wide thickness flange

[5] Function
2 = Two-way
3 = Three-way

[6] Coil rating
B = 110 V AC 50/115 V AC 60
D = 220 V AC 50/230 V AC 60
G = 12 V DC
H = 24 V DC

[7] Design number, 10 series
Subject to change. Installation dimensions unaltered for design numbers 10 to 19 inclusive.

For Electrical Plugs
See "Installation Dimensions" section.

For Tool Kits for CVUA Valves
See "Installation Dimensions" section.

For Mounting Subplates and Bolt Kits for DG*VP Models
See catalogs 2425 and 2314.
Note: CVUA valves are supplied complete with mounting flanges and metric fixing bolts.

Operating Data

Pressure and Flow Limits

Max. Pressure
Non-F3-Prefix Models:
For <10 switching cycles/min ..... 315 bar (4500 psi)
For 10 to 150 switching cycles/min ..... 210 bar (3000 psi)

F3-Prefix Models:
Up to 150 switching cycles/min ..... 210 bar (3000 psi)
Note: For all valves lower limits may apply if high-water-based fluids (e.g. 5%/95% oil-in-water emulsions) are to be used; contact your Vickers representative.

Max. Flow Rate ..... Up to 20 L/min (5.3 USgpm)

Control Data

Rated Power Supply
See "Model Codes" section.

Power Consumption, AC Solenoids
Inrush, max.▲ VA 390
Steady-state ▼ VA 195
Holding VA 57
All above values are RMS

▲ *Armature fully retracted, 1st half-cycle.*
▼ *At start of normal working stroke of valve spool. Previously called "inrush".*

Power Consumption, DC Solenoids
At rated voltage and wire temperature of 20°C (68°F) 38W

Relative Duty Factor
100% continuous rating

Type of Protection
Weatherproof to IEC 144 Class IP65
Winding Insulation to Class H
Epoxy resin to Class F

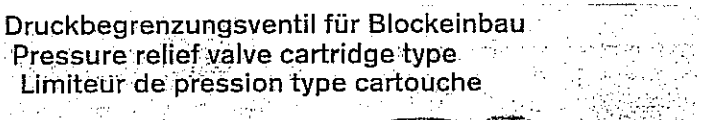
Permissible Voltage Fluctuation
± 5% of rated voltage

A.2

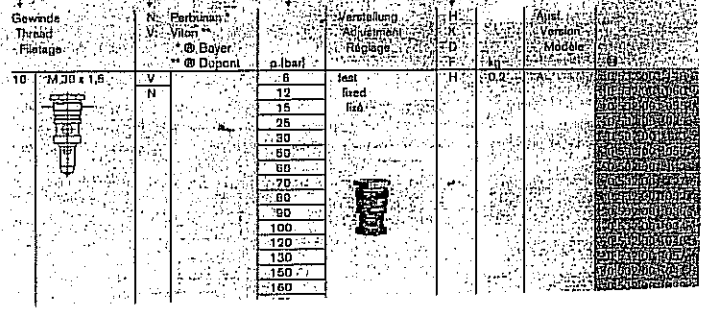
Vesuvius Systems	Drawn	Date	BY
		27-2-2007	NAL
TITLE	MOD.	NUMBER	
DIRECT. VALVE DN06-3/2-24VDC (SERIE10)	HY	9D13488	

Catalogue .....: VICKERS
Manufacturer name ....: VICKERS
Manufacturer reference : EV DG3VP-3-102AV-MUH10

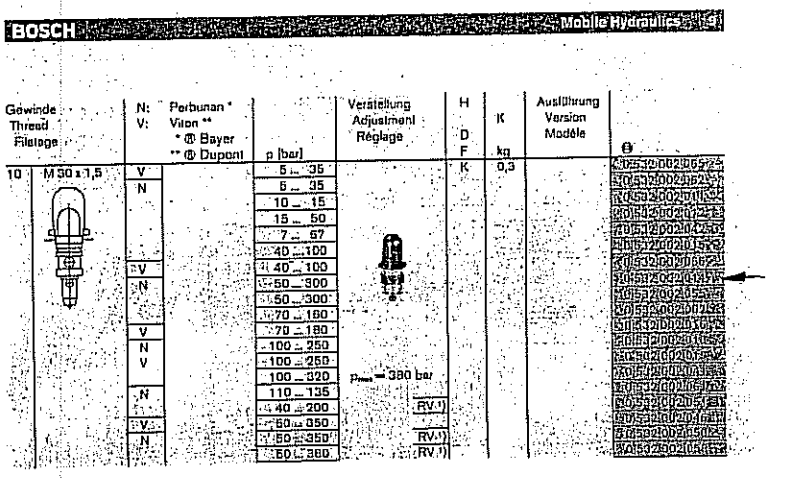
Druckbegrenzungsventil für Blockeinbau
Pressure relief valve cartridge type
Limiteur de pression type cartouche



0 532 VA 01 N – 3 0 0 – H – 1 AO



Gewinde / Thread / Filetage		N: Perbunan * V: Viton ** * ® Bayer ** ® Dupont	p [bar]	Verstellung / Adjustment / Réglage	H / D / F	K / kg	Ausführung / Version / Modèle	
10	M 30 x 1,5	V	6	fest / fixed / fixé	H	0,2	AO	0532002014
		N	12					0532002015
			15					0532002016
			25					0532002017
			30					0532002018
			60					0532002019
			68					0532002020
			70					0532002021
			80					0532002022
			90					0532002023
			100					0532002024
			120					0532002025
			130					0532002026
			150					0532002027
			160					0532002028



BOSCH — Mobile Hydraulics

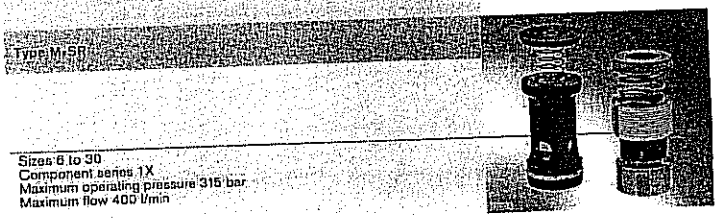
Gewinde / Thread / Filetage		N: Perbunan * V: Viton ** * ® Bayer ** ® Dupont	p [bar]	Verstellung / Adjustment / Réglage	H / D / F	K / kg	Ausführung / Version / Modèle	
10	M 30 x 1,5	V	5 ... 35		K	0,3		0532002062
		N	5 ... 35					0532002063
			10 ... 15					0532002064
			15 ... 50					0532002065
			7 ... 67					0532002066
		V	40 ... 100					0532002067
		N	40 ... 100					0532002068
			50 ... 300					0532002069
			50 ... 300					0532002070
		V	70 ... 180					0532002071
		N	70 ... 180					0532002072
		V	100 ... 250					0532002073
			100 ... 250					0532002074
			100 ... 320	p_{max} = 380 bar				0532002075
		N	110 ... 135					0532002076
			40 ... 200	RV.1				0532002077
		V	50 ... 350					0532002078
		N	50 ... 350	RV.1				0532002079
			50 ... 380	RV.1				0532002080

Catalogue .....: BOSCH
Manufacturer name ....: BOSCH
Manufacturer reference : 0532002014

Vesuvius Systems	Drawn	Date	BY
		27-2-2007	NAL
TITLE	MOD.	NUMBER	
PRESSURE RELIEF VALVE - VITON	HY	9D13489	

Check valve, cartridge type

RE 20380/11.06 1/0
Replaces: 12.02



Sizes 6 to 30
Component series 1X
Maximum operating pressure 315 bar
Maximum flow 400 l/min

Table of contents

	Page
Contents	1
Features	2
Ordering code	2
Standard types	2
Symbols	3
Sections	3
Technical data	4
Characteristic curves – angle valve	5
Characteristic curves – straight valve	6, 7
Mounting cavity – angle valve	8
Mounting cavity – straight valve	

Features

- For installation in manifold blocks
  - as angle valve
  - as straight valve
- Leak-free closure in one direction
- Various cracking pressures, optional (see ordering code)

Information on available spare parts:
www.boschrexroth.com/spc

Ordering code

M-SR | | | –1X/ | |

Check valve, cartridge design	= M-SR
Size 6 (not as angle valve)	= 6
Size 8	= 8
Size 10	= 10
Size 15	= 15
Size 20	X = 20
Size 25	= 25
Size 30	= 30
Component design	
Angle valve	X = KE
Straight valve	= KD
Component series 10 to 19 (10 to 19: unchanged installation and connection dimensions)	1X =
Seal material	
NBR seals	No code =
FKM seals (with angle valve only) ⚠ Important! Observe compatibility of seals with hydraulic fluid used!	V =
Further details in clear text	
Cracking pressure (see characteristic curves on pages 4 and 5)	
Without spring (not for straight valve)	00 =
	02 =
(Standard)	X 05 =
	15 =
	30 =
	50 =

Standard types

Type	Material number
M-SR 6 KD05-1X/	R900351888
M-SR 8 KE02-1X/	R900357438
M-SR 8 KE05-1X/	R900346063
M-SR 10 KE05-1X/	R900344549
M-SR 15 KE02-1X/	R900348943
M-SR 15 KE05-1X/	R900345372

Type	Material number
M-SR 20 KE02-1X/	R900345744
M-SR 20 KE05-1X/	R900340979
M-SR 25 KE05-1X/	R900344778
M-SR 30 KE05-1X/	R900344919

Further standard types and components can be found in the EPS (standard price list).

Symbols

With spring

Without spring

Vesuvius Systems	Drawn	Date	BY
		28-2-2007	NAL
TITLE	MOD.	NUMBER	
CHECK VALVE DN20-M-SR20KE05	HY	9D13497	

Catalogue .....: REXROTH
Manufacturer name ....: REXROTH
Manufacturer reference : M-SR20KE05-1X/V

SUPPLIER NAME : REXROT MANNESMANN REXROTH (SA)

SUPPLIER REF : HY00235864

MANUFACTURER : HYDAC HYDAC
CATALOG : NAME :
YEAR :
PAGE :
MANUFACT. REF : SB330-20A1/112A-330A
GROUPE : HY
FAMILY : ACML
MESURING UNIT : PC

5. TECHNICAL SPECIFICATIONS

5.1. MODEL CODE

(also order example)

SB 330 H - 32 A 1 / 112 B - 280 A

Series

Type
H = High Flow
Standard and low pressure accumulators
no details

Nominal Volume in l

Fluid Connection
A = thread
F = flange (full details required)

Type Code
1 = standard model
2 = back-up model (from 20 l)

Material Code[1]
112 = standard for mineral oil
depending on operating medium
others on request

Fluid Connection
1 = C-steel
2 = stainless steel 1.4021
3 = stainless steel (Niro)[3]
4 = C-steel with surface protection
6 = low temperature steel

Accumulator Shell
0 = elastomer (coated internally)
1 = C-steel
2 = chemically nickel plated (internally)
4 = stainless steel (Niro)[3]
6 = low temperature steel

Accumulator Bladder[2]
= NBR
= ECO
4 = IIR (Butyl)
5 = TT-NBR (low temperature)
6 = FPM
7 = others

User Country
A = Federal Republic of Germany
For other countries see table page 10

Permissible Operating Pressure (bar)

Connection Thread to
A = ISO 228 (BSP)
B = DIN 13 to ISO 965/1 (metric)
C = ANSI B 1.1 (UNF, sealing to SAE)
D = ANSI B 2.1 (NPT)

Desired gas pre-charge pressure to be stated separately!

1) Not all combinations are possible.
2) When ordering spare bladders, please state bladder connection port size.
3) Depending on type and pressure rating.

5.2. GENERAL

5.2.1. **Working pressure [bar]**
see tables
In some countries this can differ from the nominal pressure.

5.2.2. **Nominal volume [litres]**
see tables

5.2.3. **Effective gas volume [litres]**
see tables; based on nominal dimensions; this differs slightly from the nominal volume and is to be used when calculating the effective volume.

5.2.4. **Effective volume [litres]**
The fluid volume available between the working pressures p_2 and p_1.

5.2.5. **Max. pressure fluid flow rate**
In order to achieve the max. flow rate given in the tables, the accumulator must be mounted vertically. It has to be taken into account that a residual fluid volume of approx. 10 % of the effective gas volume remains in the accumulator.

5.2.6. **Fluids**
Mineral oils, hydraulic oils, non-flam fluids, water, emulsions, fuels. Other media on request.

5.2.7. **Gas charging**
Do not use oxygen when charging bladder accumulators: nitrogen only (risk of explosion). Before dispatch all bladder accumulators are supplied with a protective pre-charge.
Higher pressures are possible on request.

5.2.8. **Permissible operating temperature**
– 10° C to + 80° C
(263 K to 353 K)
Others on request

5.2.9. **Permissible pressure ratio**
Ratio of max. working pressure p_2 to gas pre-charge pressure p_0. (see point 3.2.1.)

ACCUMULATOR SB330-20A1	TITLE	VESUVIUS SYSTEMS		
SEM85	MOD.	Drawn		
9B44662	NUMBER	06/10/00	Date	BY
		CAL		

VESUVIUS SYSTEMS

CALIBRATED NOZZLE CHANGER

CUSTOMER FILE

MECHANICAL EQUIPMENT
1
2
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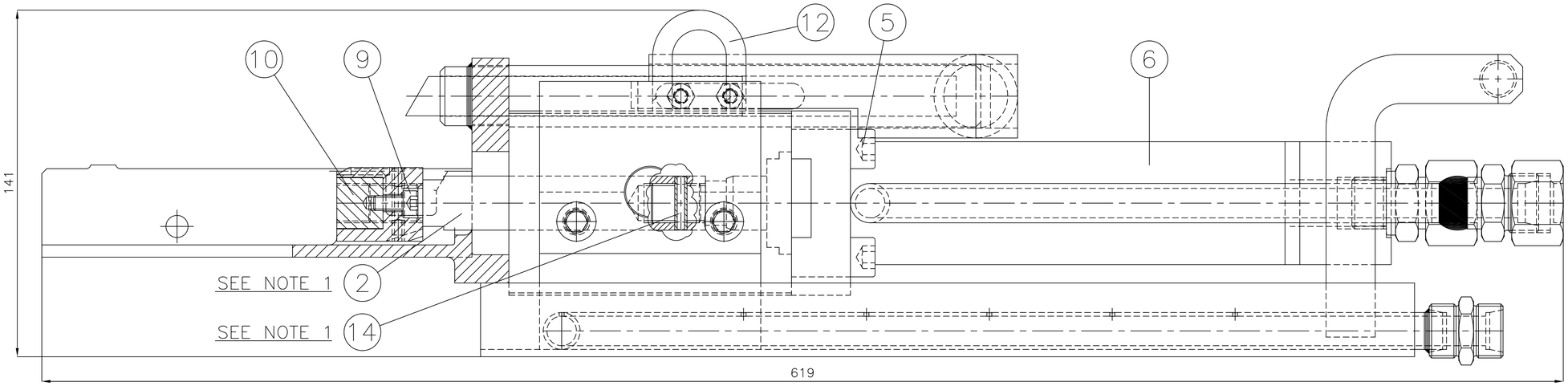
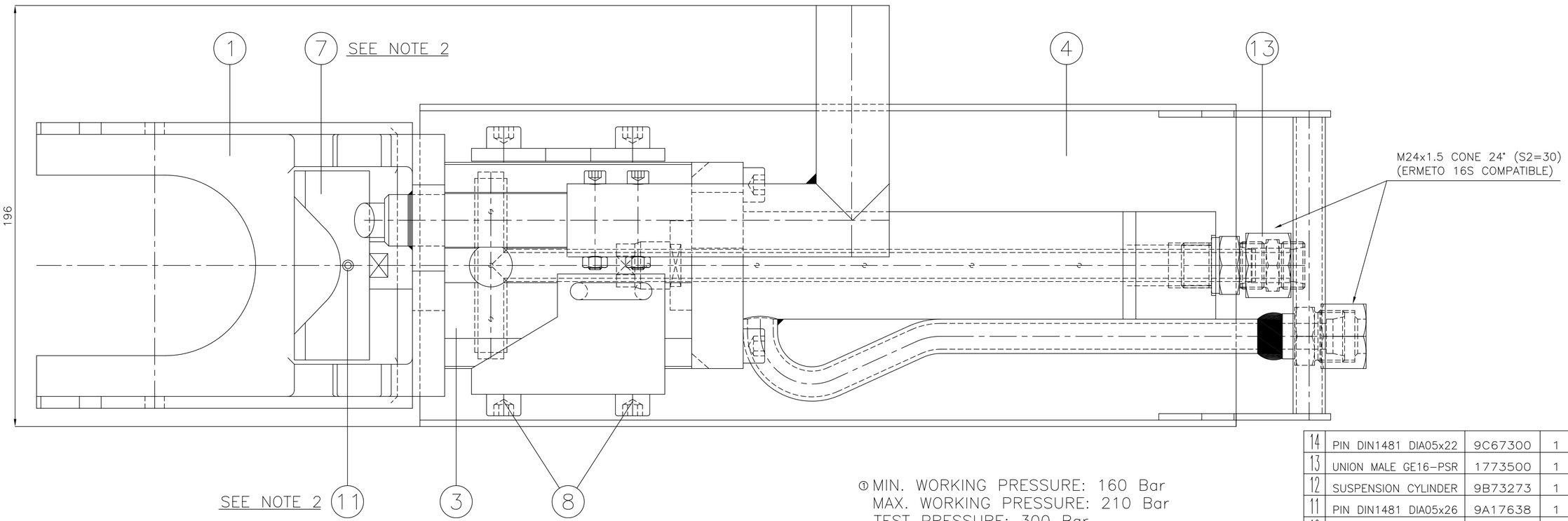
4
HYDRAULIC EQUIPMENT
5
6
7 HYDRAULIC CYLINDER
8
9
TOOLS
10
INSTRUCTIONS
11
REFRACTORIES
12
PURCHASE
13
14
AUTOMATION
15
16





① MIN. WORKING PRESSURE: 160 Bar
MAX. WORKING PRESSURE: 210 Bar
TEST PRESSURE: 300 Bar
PISTON: 40mm
PISTON ROD: 22mm
STROKE: 130mm
SET OF SEALS: 9A13306

NOTE 1 :

- INSTALL AND TIGHT THE ROD SPACER
- DRILL A HOLE THROUGH THE PISTON ROD
- INSERT THE PIN (ITEM 14)

NOTE 2 :

- INSTALL AND TIGHT THE RAM HEAD
- DRILL A HOLE THROUGH THE PISTON ROD
- INSERT THE PIN (ITEM 11)
- INSTALL THE MAGNETS WITH LOCTITE

ITEM	DESIGNATION	NUMBER	QTY.			WEIGHT
14	PIN DIN1481 DIA05x22	9C67300	1			
13	UNION MALE GE16-PSR	1773500	1			
12	SUSPENSION CYLINDER	9B73273	1			
11	PIN DIN1481 DIA05x26	9A17638	1			
10	MAGNET MODIFIED	9B29614	2			
9	SCREW DIN912 M06x12	0780300	2			
8	SCREW DIN912 M10x20	1051900	4			
7	RAM HEAD	9B26272	1			
6	CYLINDER DIA40	9B27213	1			
5	SCREW DIN912 M10x150-12.9	9B31173	4			
① 4	HEAT SHIELD CYLINDER	9E00473	1			
3	SPACER	9B30845	1			
2	ROD SPACER	9B30852	1			
① 1	CYLINDER HEAD ASSY DIA50	9C46049	1			

VESUVIUS

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WEIGHT		
DRAWN	04/04/2006	CCO
APPROVED FOR MANUFACTURING	04/04/2006	LR
SCALE: 1 / 1		

TRACABILITY PUR 34
- Markings must be easily readable
- Mark Vesuvius logo + Supplier Initials ex. : (DD)

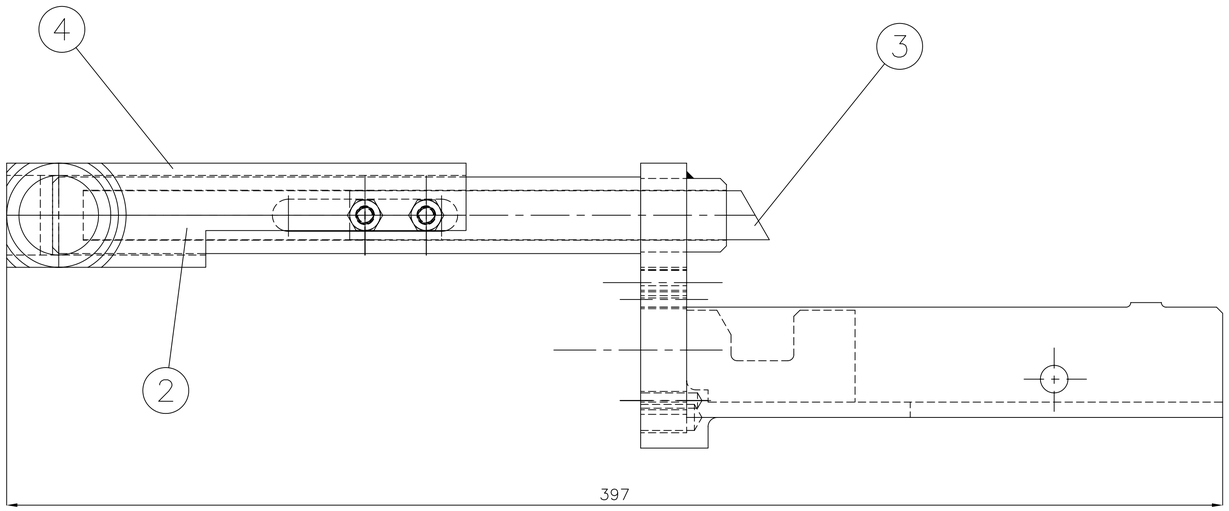
TITLE	MOD.	NUMBER	VERS.
PLATE LOADER EXTENDED ASSY DIA40	CNC	9C67151	1

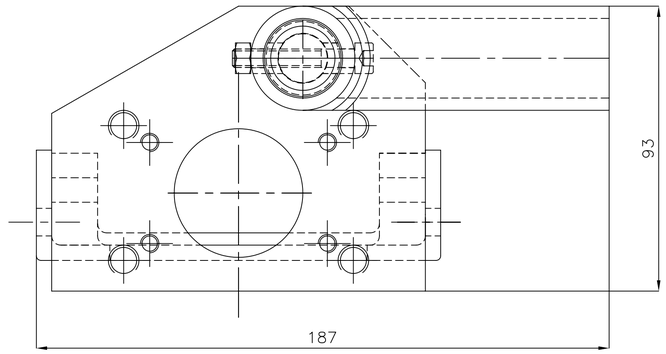
VESUVIUS GROUP S.A.
Rue de Douvrain, 17
B-7011 GHLIN
BELGIQUE

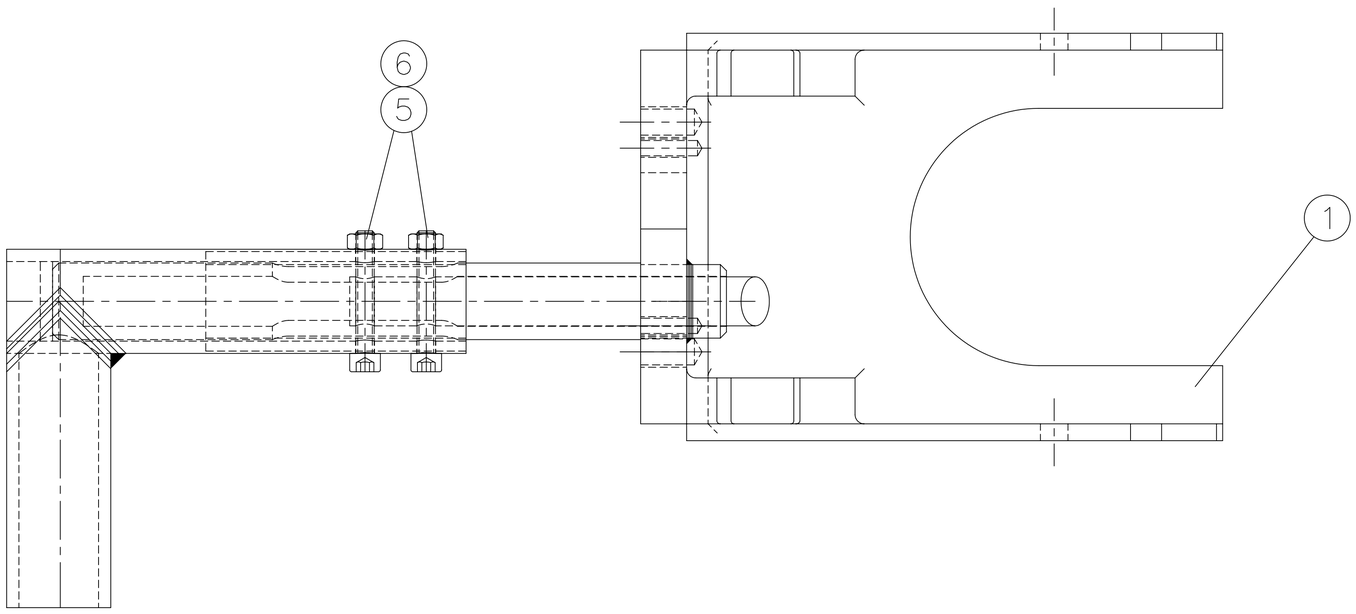
Vesuvius Systems Ghlin | Item's part List | BOM Level: Level 0

	9C67151	**9C67151**	**PLATE LOADER EXTENDED ASSY DIA**				**A1**

Level	Items	DWG Nbr	Type	Marker	Description	Quantity	Unit	Format
0	9C46049	9C46049 - 01	BOM	1	CYLINDER HEAD ASSY DIA50	1,00	PC	A1
0	9B29614	9B29614 - 00	BOM	10	MAGNET MODIFIED	2,00	PC	A3
0	9A17638	9A17638 -	Item	11	PIN DIN1481 DIA05X26	1,00	PC	A4
0	9E01701	9E01701 - 00	BOM	12	SUSPENSION CYLINDER ASSY	1,00	PC	A2
0	1773500	1773500 -	Item	13	UNION MALE GE 16-PSR	1,00	PC	A4
0	9C67300	9C67300 -	Item	14	PIN DIN1481 DIA05 X22	1,00	PC	A4
0	9E01703	9E01703 - 00	Item	15	WASHER FOR SUSPENSION CYLINDER	2,00	PC	A3
0	9B30852	9B30852 - 03	Item	2	ROD SPACER	1,00	PC	A3
0	9B30845	9B30845 - 04	Item	3	SPACER	1,00	PC	A3
0	9E00473	9E00473 - 00	Item	4	HEAT SHIELD CYLINDER	1,00	PC	A1
0	9C32007	9C32007 - 02	Item	4	HANDLE	1,00	PC	A2
0	9B31173	9B31173 -	Item	5	SCREW DIN912 M10X150-12.9	4,00	PC	A4
0	9B27213	9B27213 - 02	BOM	6	CYLINDER DIA40 CNC	1,00	PC	A2
0	9B26272	9B26272 - 04	Item	7	RAM HEAD	1,00	PC	A3
0	1051900	1051900 -	Item	8	SCREW DIN912 M10X20	4,00	PC	A4
0	0780300	0780300 -	Item	9	SCREW DIN912 M06X12	2,00	PC	A4







①

ITEM	DESIGNATION	NUMBER	QTY.			WEIGHT
6	NUT DIN934 M6	0717000	2			
5	SCREW DIN912 M06X40	1140400	2			
4	HANDLE	9C32007	1			
3	AXLE	9B22271	1			
2	SPRING	0008846	1			
1	CYLINDER HEAD ø50	9B22024	1			

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WEIGHT		
DRAWN	31/03/2006	CCO
APPROVED FOR MANUFACTURING	03/04/2006	LR
	SCALE: 1 / 1	

TRACABILITY PUR 34
- Markings must be easily readable
- Mark Vesuvius logo + Supplier Initials ex. : (DD)

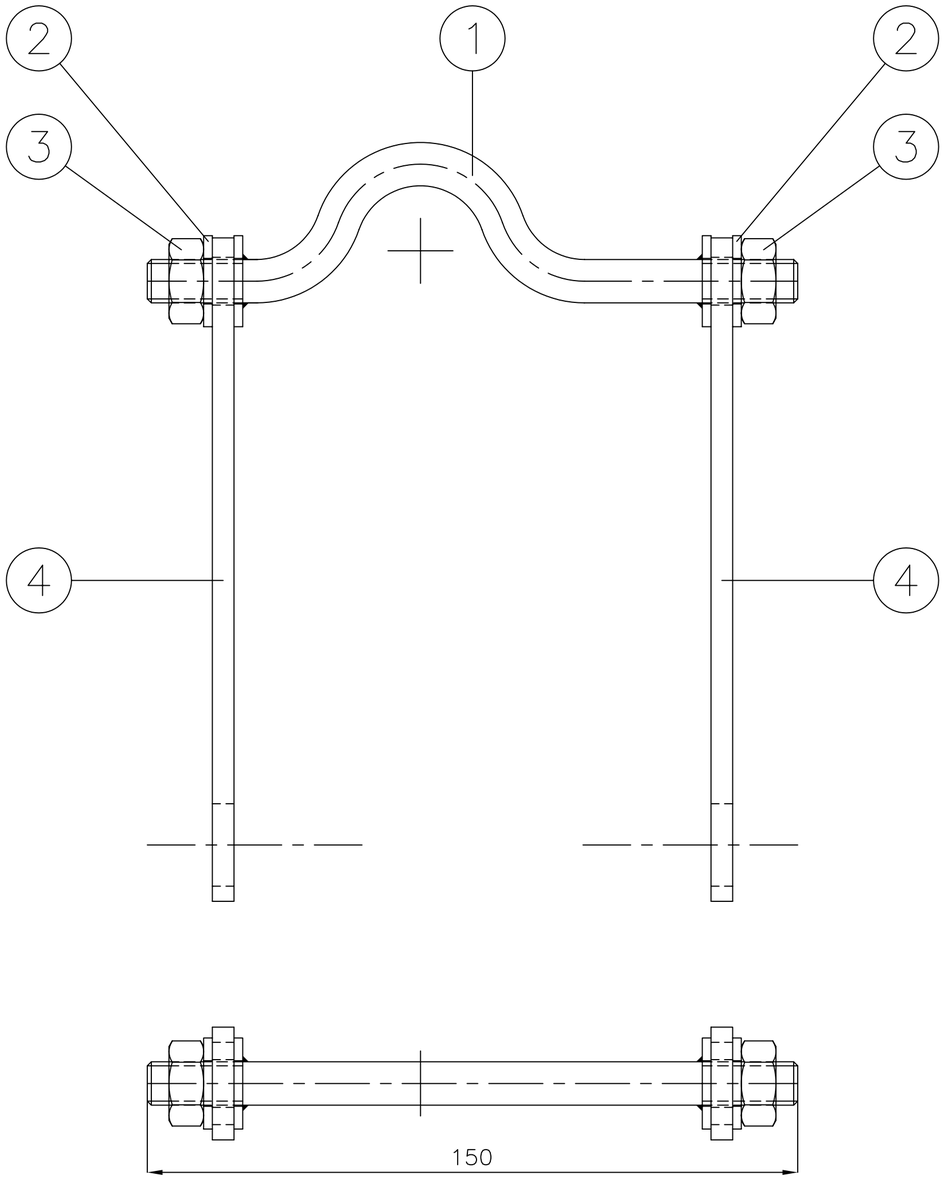
TITLE	MOD.	NUMBER	VERS.
CYLINDER HEAD ASSY DIA50	CNC	9C46049	1

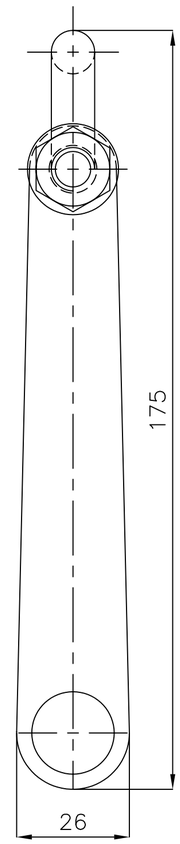
VESUVIUS GROUP S.A.
Rue de Douvrain, 17
B-7011 GHLIN
BELGIQUE

Vesuvius Systems Ghlin | Item's part List | BOM Level: Level 0

	9C46049	**9C46049**	**CYLINDER HEAD ASSY DIA50**				**A1**

Level	Items	DWG Nbr	Type	Marker	Description	Quantity	Unit	Format
0	9B22024	9B22024 - 03	BOM	1	CYLINDER HEAD DIA50	1,00	PC	A1
0	0008846	0008846 -	Item	2	SPRING	1,00	PC	A4
0	9B22271	9B22271 - 01	Item	3	AXLE	1,00	PC	A3
0	1140400	1140400 -	Item	5	SCREW DIN912 M06X40	2,00	PC	A4
0	0717000	0717000 -	Item	6	NUT DIN934 M06	2,00	PC	A4





ITEM	DESIGNATION	NUMBER	QTY.			WEIGHT
4	SUSPENSION CYLINDER ARM	9E01699	2			
3	NUT DIN934 M10	0710600	2			
2	WASHER DIN125A ø10	1133900	2			
1	SUSPENSION CYLINDER ROD	9E01700	1			

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WEIGHT		
DRAWN	30/11/2006	CCO
APPROVED FOR MANUFACTURING	30/11/2006	SC
	SCALE: 1 / 1	

TRACABILITY PUR 34
- Markings must be easily readable
- Mark Vesuvius logo + Supplier Initials ex. : (DD)

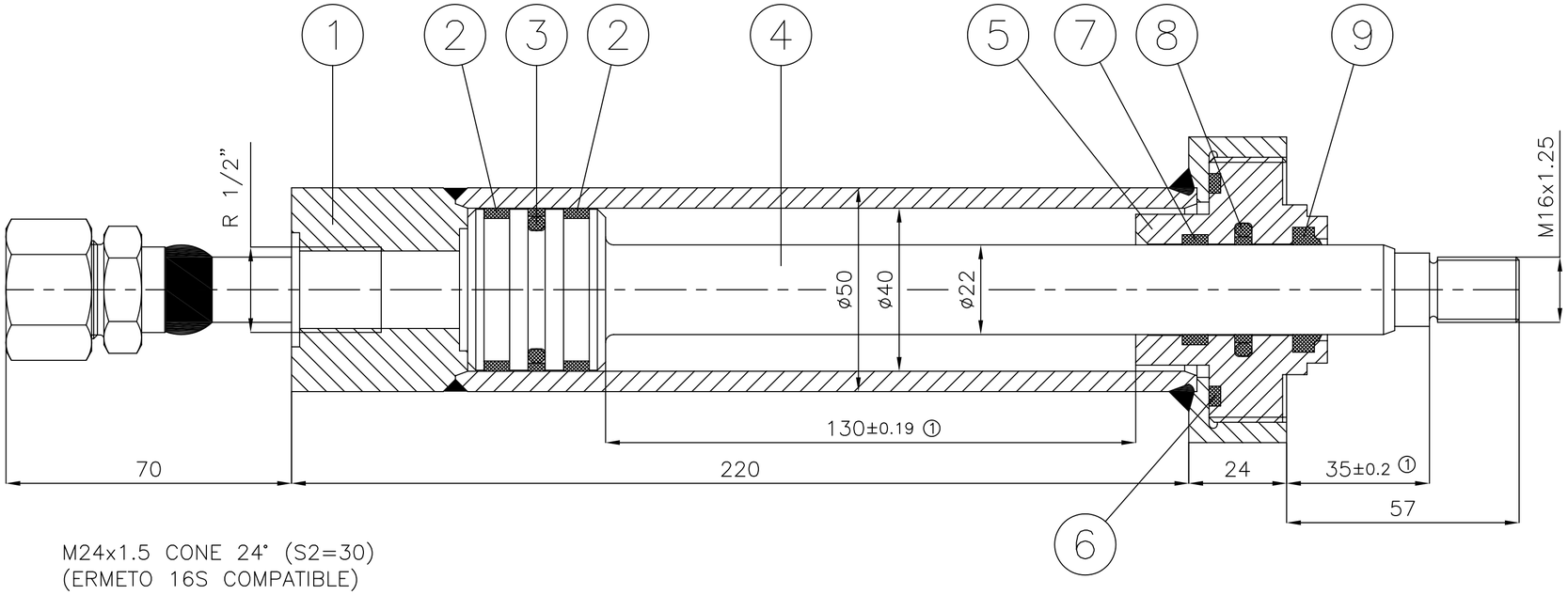
TITLE	MOD.	NUMBER	VERS.
SUSPENSION CYLINDER ASSY	CNC	9E01701	0

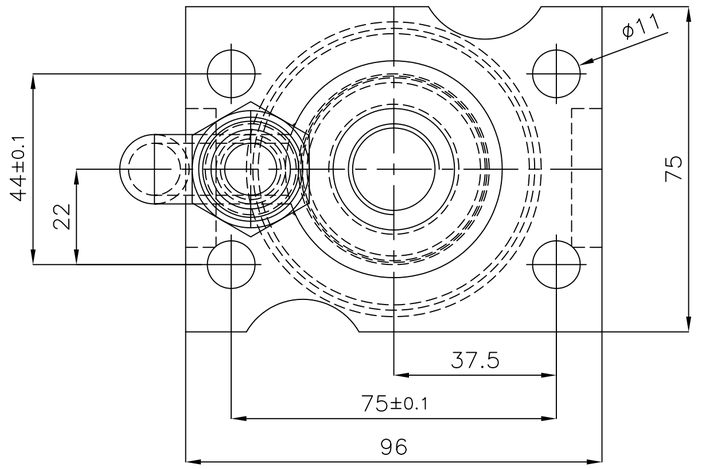
VESUVIUS GROUP S.A.
Rue de Douvrain, 17
B-7011 GHLIN
BELGIQUE

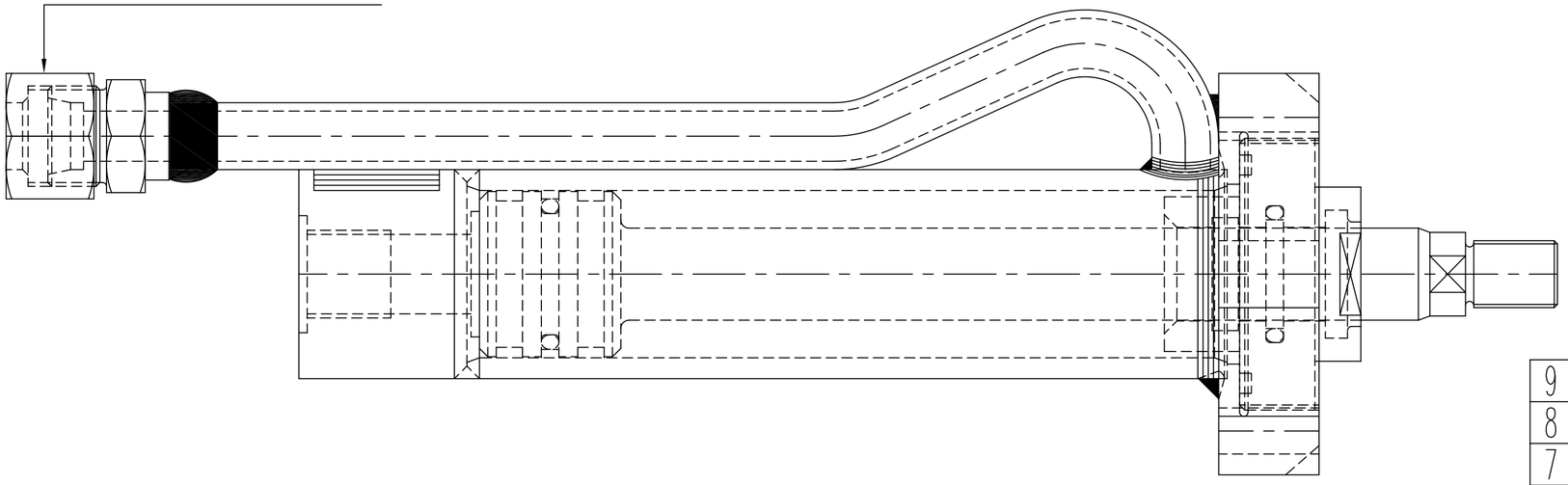
Vesuvius Systems Ghlin | Item's part List | BOM Level: Level 0

	9E01701	**9E01701**	**SUSPENSION CYLINDER ASSY**				**A2**

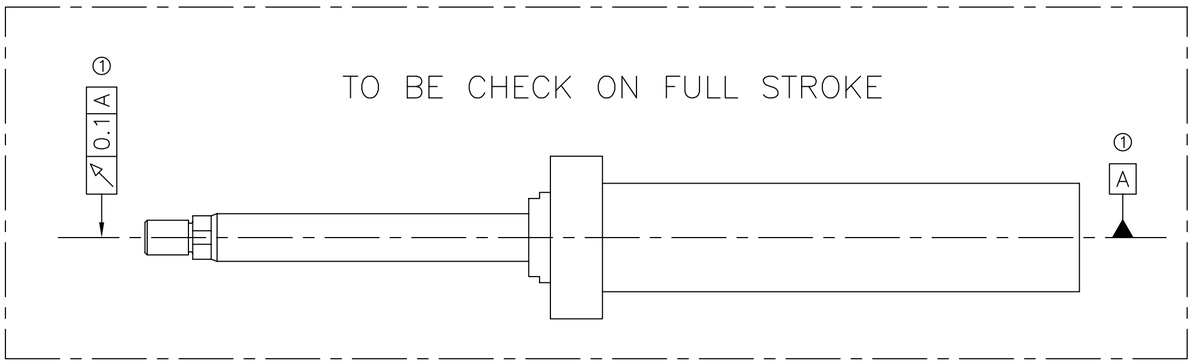
Level	Items	DWG Nbr	Type	Marker	Description	Quantity	Unit	Format
0	9E01700	9E01700 - 00	Item	1	SUSPENSION CYLINDER ROD	1,00	PC	A3
0	1133900	1133900 -	Item	2	WASHER DIN125A DIA10	2,00	PC	A4
0	0710600	0710600 -	Item	3	NUT DIN934 M10	2,00	PC	A4
0	9E01699	9E01699 - 00	Item	4	SUSPENSION CYLINDER ARM	2,00	PC	A3







MIN. WORKING PRESSURE: 160 Bar
MAX. WORKING PRESSURE: 210 Bar
TEST PRESSURE: 300 Bar
SET OF SEALS: 9A13306



	ITEM	DESIGNATION	NUMBER	QTY.			WEIGHT
	9	SCRAPER RING	0009443	1			
	8	ROD SEAL	0009666	1			
	7	ROD GUIDING SEAL	0009434	1			
	6	O-RING 50.39x3.53-90°SHORE	9A17612	1			
①	5	CYLINDER GLAND DIA40	9A05575	1			
①	4	CYLINDER ROD DIA40	9A05609	1			
	3	PISTON SEAL DIA40	9A09023	1			
	2	PISTON GUIDING SEAL DIA40	9A09015	2			
①	1	CYLINDER BARREL DIA40	9B27155	1			

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This drawing must be returned after use.

WEIGHT		
DRAWN	03/04/2006	CCO
APPROVED FOR MANUFACTURING	03/04/2006	LR
	SCALE: 1 / 1	

TRACABILITY PUR 34
- Markings must be easily readable
- Mark Vesuvius logo + Supplier Initials ex. : (DD)

TITLE	MOD.	NUMBER	VERS.
CYLINDER DIA40	CNC	9B27213	2

VESUVIUS GROUP S.A.
Rue de Douvrain, 17
B-7011 GHLIN
BELGIQUE

Vesuvius Systems Ghlin | Item's part List | BOM Level: Level 0

	9B27213	**9B27213**	**CYLINDER DIA40 CNC**				**A2**

Level	Items	DWG Nbr	Type	Marker	Description	Quantity	Unit	Format
0	9A13306	9A13306 - 01	BOM		SET OF SEALS	1,00	PC	PL
0	9A05575	9A05575 - 02	Item	1	CYLINDER GLAND DIA40	1,00	PC	A3
0	9B27155	9B27155 - 04	Item	2	CYLINDER BARREL DIA40	1,00	PC	A2
0	9A05609	9A05609 - 04	Item	6	CYLINDER ROD DIA40	1,00	PC	A3

VESUVIUS GROUP S.A.
Rue de Douvrain, 17
B-7011 GHLIN
BELGIQUE

Vesuvius Systems Ghlin | Item's part List | BOM Level: Level 0

	9A13306	**9A13306**	**SET OF SEALS**				**PL**
Level	Items	DWG Nbr	Type	Marker	Description	Quantity	Unit Format
0	9A09023	9A09023 -	Item	3	PISTON SEAL	1,00	PC A4
0	9A09015	9A09015 - 00	Item	4	PISTON GUIDING SEAL	2,00	PC A3
0	9A17612	9A17612 -	Item	5	O-RING 50.39X3.53 VITON	1,00	PC A4
0	0009434	0009434 - 00	Item	7	ROD GUIDING SEAL	1,00	PC A3
0	0009666	0009666 -	Item	8	ROD SEAL	1,00	PC A4
0	0009443	0009443 -	Item	9	SCRAPER RING 30X22X7	1,00	PC A4

VESUVIUS SYSTEMS

CALIBRATED NOZZLE CHANGER

CUSTOMER FILE

MECHANICAL EQUIPMENT
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HYDRAULIC EQUIPMENT
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8 HYDRAULIC HOSES
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TOOLS
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INSTRUCTIONS
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PURCHASE
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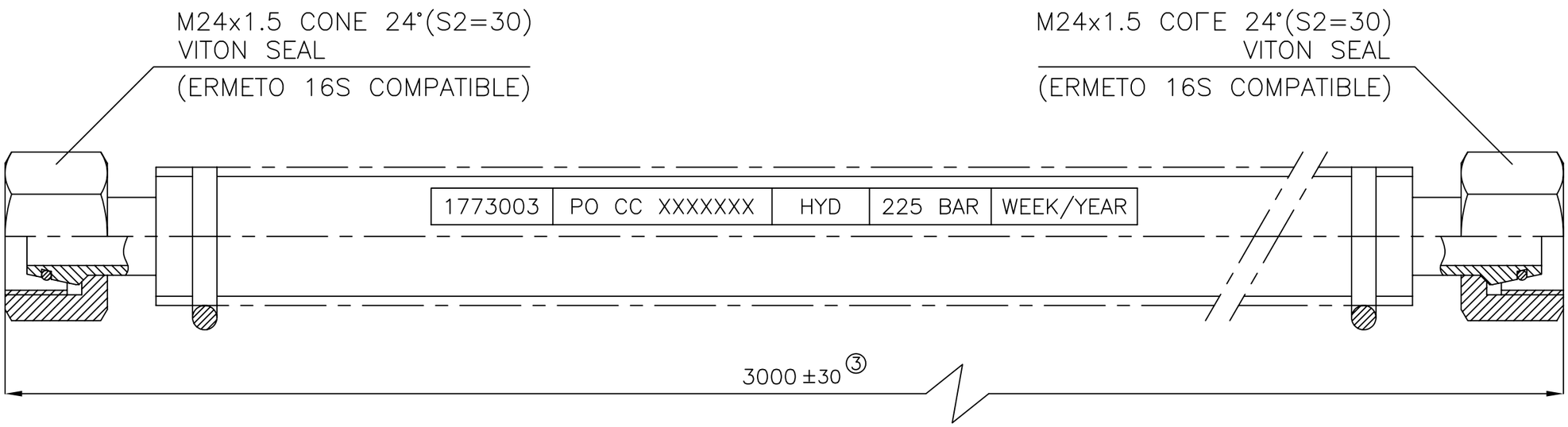
AUTOMATION
15
16

MARK BY METALLIC LABELLING OR METALLIC STAMPING RING

PART NUMBER	PO NUMBER	FLUID TYPE	WORKING PRESSURE	MANUFACTURING DATE
1773003	PO CC XXXXXXX	HYD	225 BAR	WEEK/YEAR



SPECIFICATIONS:

HFD–U ORGANIC ESTER OR COMPATIBLE HLP,HFC
HOSE HIGH PRESSURE DN12 – SYNTHETIC RUBBER 2ST12
SWIVELS NUTS 16S (M24x1.5) ACCORDING TO DIN20078T9 (SERIES S) / STEEL
HEAT RESISTANT JACKET
PLASTIC PLUG FOR TRANSPORTATION
TEST PRESSURE 660BAR
BURST PRESSURE 1100BAR
BENDING RADIUS: 180 mm

REF:

DIN20022 part 2 ACC. TO ISO STANDARD 1436
SAE 100R2A

ITEM	DESIGNATION	NUMBER	QTY.		WEIGHT

VESUVIUS

WEIGHT	2.8	
DRAWN	17/07/2006	CCO
APPROVED FOR MANUFACTURING	26/07/2006	GAC
	SCALE: 1/1	

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TITLE	MOD.	NUMBER	VERS.
HOSE DN12 16S L=3000	HYD	1773003	3

VESUVIUS SYSTEMS

CALIBRATED NOZZLE CHANGER

CUSTOMER FILE

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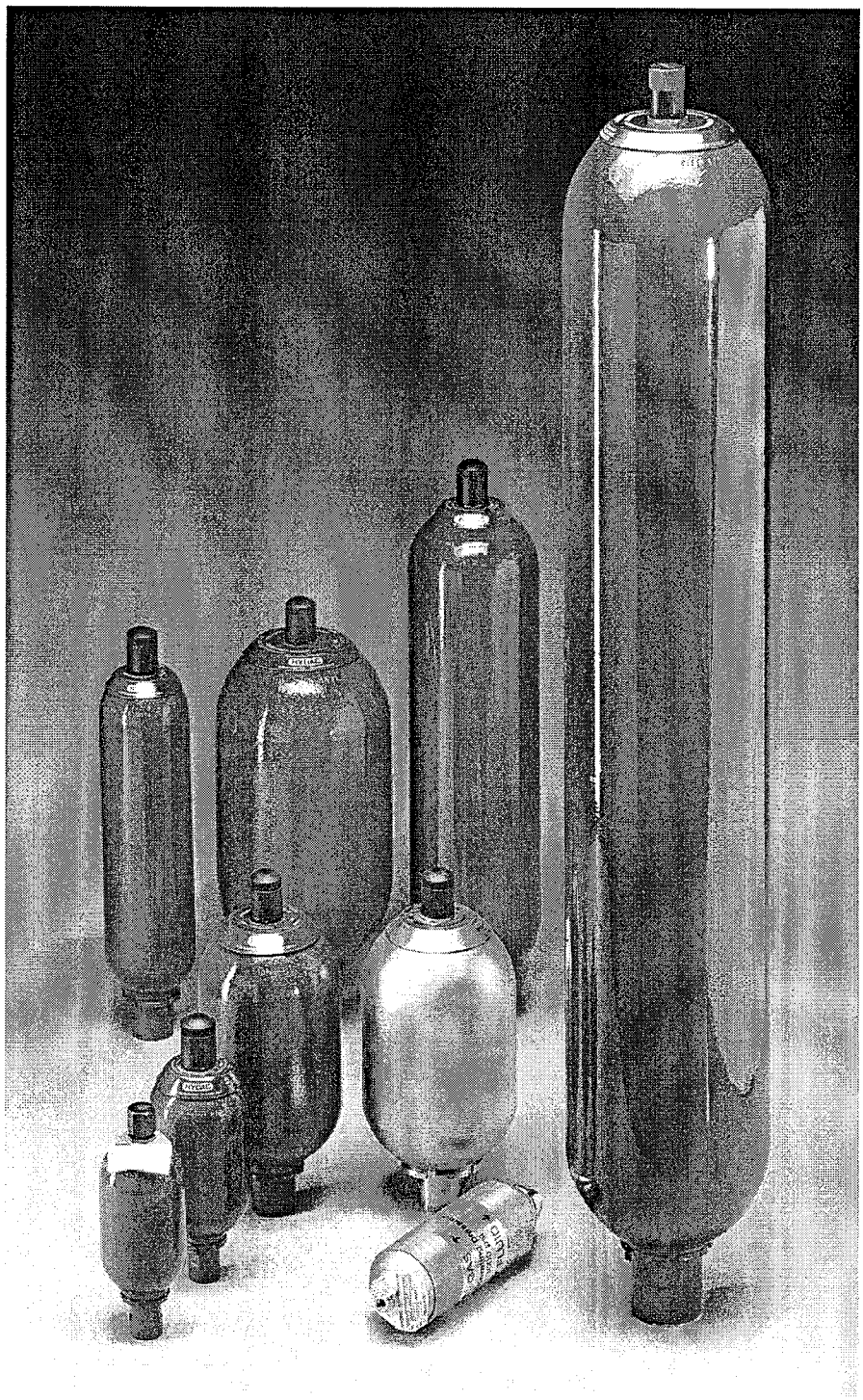
HYDAC INTERNATIONAL

Bladder Accumulators
Standard



1. DESCRIPTION

1.1. FUNCTION

Fluids are practically incompressible and cannot therefore store pressure energy.

The compressibility of a gas is utilised in hydro-pneumatic accumulators for storing fluids. HYDAC bladder accumulators are based on this principle, using nitrogen as the compressible medium.

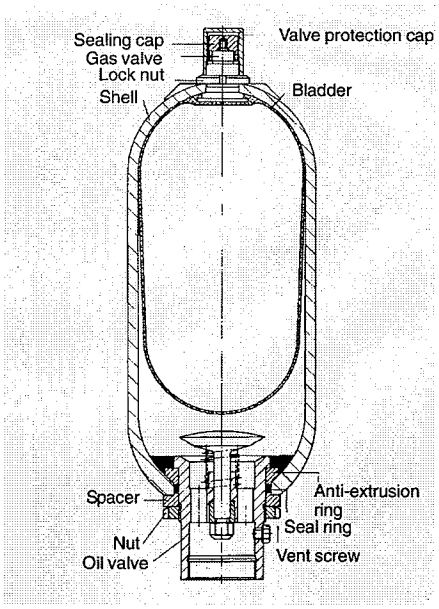
The bladder accumulator consists of a fluid section and a gas section with the bladder acting as a gas-proof screen. The fluid around the bladder is connected with the hydraulic circuit, so that the bladder accumulator draws in fluid when pressure increases and the gas is compressed. When the pressure drops, the compressed gas expands and forces the stored fluid into the circuit.

HYDAC bladder accumulators can be used in a wide variety of applications, some of which are listed below:

- energy storage
- emergency operation
- force equilibrium
- leakage compensation
- volume compensation
- shock absorption
- vehicle suspension
- pulsation damping

(see brochure on Hydraulic Dampers no. 3.701../..)

1.2. CONSTRUCTION



1.2.1 **Construction**

- **Standard bladder accumulators SB330/400/500/550**

  HYDAC standard bladder accumulators consist of the pressure vessel, the flexible bladder with gas valve and the hydraulic connection with check valve. The pressure vessel is seamless and manufactured from high tensile steel.

- **Bladder accumulator SB330N**

  The flow optimised design of the standard oil valve enables the maximum possible operating fluid flow rate to increase to 25 l/s on this accumulator type.

- **High Flow bladder accumulator SB330H**

  HYDAC high flow bladder accumulators, type SB330H, are high performance accumulators with a flow rate of up to 30 l/s. The fluid connection is enlarged to allow higher flow rates.

1.2.2 **Bladder materials**
The following elastomers are available as standard:

- NBR (acrylonitrile butadiene rubber, Perbunan),
- IIR (butyl rubber),
- FKM (fluoro rubber, Viton®),
- ECO (ethylene oxide epichlorohydrin rubber).

The material used depends on the respective operating medium and temperature.

1.2.3 **Corrosion protection**
For use with chemically aggressive media the accumulator shell can be supplied with corrosion protection, such as plastic coating on the inside or chemical nickel plating.

If this is insufficient, then stainless steel accumulators must be used.

1.3. MOUNTING POSITION

HYDAC bladder accumulators can be installed vertically, horizontally and at a slant.

When installing vertically or at a slant, the oil valve must be at the bottom. On certain applications listed below, particular positions are preferable:

- energy storage: vertical
- pulsation damping: any position from horizontal to vertical
- maintaining constant pressure: any position from horizontal to vertical
- volume compensation: vertical

If the mounting position is horizontal or at a slant the effective volume and the maximum permissible fluid flow rate are reduced.

1.4. TYPE OF MOUNTING

- By using an appropriate adaptor, HYDAC accumulators, up to size 1 l, can be mounted directly inline
- For strong vibrations and volumes above 1 l, we recommend the use of HYDAC accumulator supports or the HYDAC accumulator mounting set.
  (Brochure "Supports for Hydraulic Accumulators" no. 3.502. and ACCUSET SB, no. 3.503.)

2. TECHNICAL SPECIFICATIONS

2.1. EXPLANATORY NOTES

2.1.1 **Working pressure**
see tables
(In some countries this can differ from the nominal pressure)

2.1.2 **Nominal volume**
see tables

2.1.3 **Effective gas volume**
see tables,
based on nominal dimensions; this differs slightly from the nominal volume and must be used when calculating the effective volume.

2.1.4 **Effective volume**
The fluid volume available between the working pressures p_2 and p_1.

2.1.5 **Max. pressure fluid flow rate**
In order to achieve the max. flow rate given in the tables, the accumulator must be mounted vertically. It has to be taken into account that a residual fluid volume of approx. 10% of the effective gas volume remains in the accumulator.

2.1.6 **Fluids**
The various seal and bladder materials are compatible with the following fluids:

Material	Fluid
NBR LOW TEMP NBR	Mineral oils (HL, HLP, HFA, HFB, HFC), water
ECO	Mineral oil
IIR	Phosphate ester
FKM	Chlorinated hydrocarbons, petrol

2.1.7 **Permissible operating temperature**
The permissible operating temperatures are dependent on the application limits of the metallic materials and the bladders.

The standard valve bodies, gas valves and accumulator shells are suitable for temperatures -10 °C to +80 °C.

Outside these temperatures, special material combinations must be used. The following table shows the correlation between bladder material and application temperature.

Material	Temperature ranges
NBR	- 15 °C to + 80 °C
LOW TEMP NBR	- 50 °C to + 80 °C
ECO	- 30 °C to + 120 °C
FKM	- 10 °C to + 150 °C

2.1.8 **Gas charging**
Always charge with 99.995% nitrogen only, filtered to < 3 µm.

If other gases are to be used, please contact HYDAC for advice.

NEVER USE OXYGEN OR COMPRESSED AIR.
RISK OF EXPLOSION.

2.1.9 **Critical values for gas pre-charge pressure**
$p_0 \leq 0.9 \times p1$
with a permissible pressure ratio of: $p_2 : p_0 \leq 4:1$
p_2 = max. operating pressure
p_0 = gas pre-charge pressure

2.1.10 **Certificate codes**

Australia	F*
Brazil	U***
Canada	S1**
China	A9
CIS	A6
EU member states	U***
Hungary	U***
India	U***
Japan	P
New Zealand	T
Poland	A4
Romania	U
Slovakia	A8
South Africa	U***
Switzerland	U
USA	S

others on request

* = approval required in the individual territories
** = approval required in the individual provinces
*** = alternative certificates possible

On no account must any welding, soldering or mechanical work be carried out on the accumulator shell. After the hydraulic line has been connected it must be completely vented. Work on systems with accumulators (repairs, connecting pressure gauges etc) must only be carried out once the pressure and fluid have been released.

Please observe operating instructions!

Note:
Application examples, accumulator sizing and extracts from approvals regulations on hydraulic accumulators can be found in the accumulator overview brochure no. 3.000../...

2.2. MODEL CODE
(also order example)

SB 330 H - 32 A 1 / 112 U - 330 A

Series

Type
H = High Flow
N = increased flow, standard oil valve dimensions
A = shock absorber
P = pulsation damper
S = suction flow stabiliser
B = bladder top-repairable
Combinations possible: e.g.
HB = High Flow with a top-repairable bladder or
PH = pulsation damper with high flow rate.
No details = standard

Nominal volume in l

Fluid connection
A = standard connection, thread with internal seal face
F = flange connection
C = valve mounting with screws on underside
E = sealing surfaces on the front interface (e.g. on thread M50 x 1.5)
G = male thread
S = special connection according to customer specification

Gas side
1 = standard model [4]
2 = back-up model
3 = gas valve 7/8-14UNF with M8 female thread
4 = 5/8" gas valve
5 = gas valve M50 x 1.5 in accumulators smaller than 50 l
6 = 7/8-14UNF gas valve
7 = M28 x 1.5 gas valve
8 = M16 x 1.5 gas valve
9 = special gas valve according to customer specification

Material code [1]
112 = standard for mineral oil
depending on operating medium
others on request

Fluid connection
1 = carbon steel
2 = high-strength steel
3 = stainless steel (Niro) [3]
6 = low temperature steel

Accumulator shell
0 = plastic coated (internally)
1 = carbon steel
2 = chemically nickel plated (internally)
4 = stainless steel (Niro) [3]
6 = low temperature steel

Accumulator bladder [2]
2 = NBR
3 = ECO
4 = IIR (Butyl)
5 = TT-NBR (low temperature)
6 = FPM
7 = others

Certificate code
U = PED 97/23/EC

Permissible operating pressure (bar)

Connection
Thread, codes for fluid connections: A, C, E, G
A = thread to ISO 228 (BSP)
B = thread to DIN 13 or ISO 965/1 (metric)
C = thread to ANSI B1.1 (UN..-2B seal to SAE J 514)
D = thread to ANSI B1.20.1 (NPT)
S = special thread according to customer specification

Flange, codes for fluid connection: F
A = DIN flange
B = flange ANSI B 16.5
C = SAE flange 3000 psi
D = SAE flange 6000 psi
S = special flange according to customer specification

Required gas pre-charge pressure must be stated separately!

1) Not all combinations are possible.
2) When ordering spare bladders, please state bladder connection port size.
3) Depending on type and pressure rating.
4) Gas valve type in SB < 50 l = 7/8 - 14 UNF, in SB ≥ 50 l = M50 x 1.5

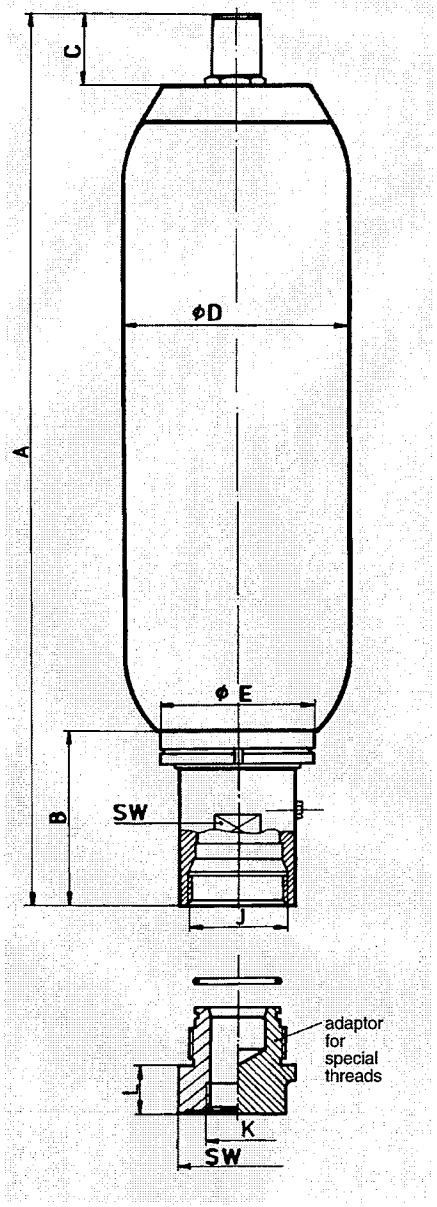
3. DIMENSIONS AND SPARE PARTS

3.1. DIMENSIONS

Nominal volume Litres	Valve	max. working pressure (PED 97/23/EC) bar	Eff. gas volume litres	Weight kg	A mm	B mm	C mm	Ø D max. mm	J thread ISO 228	Ø E mm	SW mm	Q[1] l/s
0.5	standard	400	0.5	2.8	270	57	33.5	95.5	G 3/4	50	32	4
1		330	1.0	4.5	302		58	118				
		550		8.5	334	68		121	G 1	67	45	
2.5		330	2.4	10	532	63		118	G 1 ¼		50	10
		550	2.5	13.5	539	68		121	G 1		45	4
4		330	3.7	11.5	410	63		173	G 1 ¼		50	10
		400		15.5				172				
5		550	4.9	23	867	68		121	G 1		45	4
6		330	5.7	15	540	63		173	G 1 ¼		50	10
10[2]		330	9.3	25	728				G 1 ¼			
10	standard	330	9.3	31.5	568	103	58	229	G 2	100	70	15
	N											25
	H		9	34.5	603	138			G2 ½	125	90	30
	standard	400	9.3	37.5	572	103			G2	100	70	15
		500	8.8	37.5	585	77	68	233				
13	standard	330	12	43	660	103	58	229	G 2	100	70	15
	N											25
	H			46	695	138		233	G 2 ½	125	90	30
	standard	400		49	666	103		229	G 2	100	70	15
20	standard	330	18.4	50.5	896	103	58	229	G 2	100	70	15
	N											25
	H		17.5	53.5	931	138			G2 ½	125	90	30
	standard	400	18.4	63.5	896	103		233	G2	100	70	15
		500	17	75.5	901	77	68	241		110	75	
24	standard	330	23.6	69.0	1062	103	79	229	G2	100	70	15
	N											25
	H		24	72	1097	138			G 2 ½	125	90	30
32	standard	330	33.9	87	1411	103	79	229	G 2	100	70	15
	N											25
	H		32.5	90	1446	138			G2 ½	125	90	30
	standard	400	33.9	104.5	1411	103		233	G2	100	70	15
		500	33.5	127	1446	77	68	241		110	75	
50	standard	330	47.5	117.5	1931	103	68	229	G 2	100	70	15
	N											25
	H			120.5	1966	138			G2 ½	125	90	30
	standard	400		142	1931	103		233	G2	100	70	15
		500	48.3	169	1951	77		241			75	
60	standard	330	60	182	1156	138	68	356	G 2 ½	125	90	30
80			85	221	1406							
100			105	255	1656							
130			133	305	1976							
160			170	396	2006			406				
200			201	485	2306							

1) Q = max. operating fluid flow rate
2) slimline version for confined spaces

Dimensions



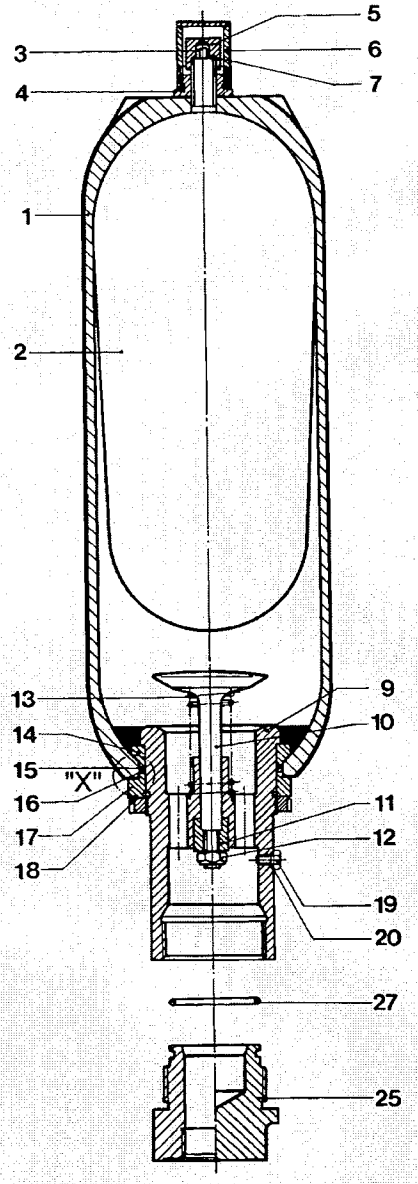
3.2. ADAPTORS [1]

Series	Nominal volume litres	J ISO 228	K ISO 228	L mm	SW mm
SB330/40 SB330 N	0.6 - 1	G ¾	G 3/8	27	32
	2.5 - 10*)	G 1¼	G ¾	13	46
	10[2] - 50	G 2	G 1½	36	65
SB550	1 - 5	G 1	G ¾	31	46
SB330	60 - 200	G 2½	G 2	40	100
SB330 H	10 - 50	G 2½			

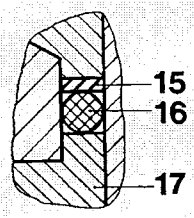
1) order separately
2) 10 l standard model
*) slimline version for confined spaces

3.3. SPARE PARTS

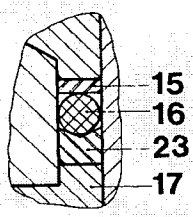
SB 330/400/440/500/550
SB 330 H / SB 330 N



Detail "X"
SB 330/400 – 0.5 to 6 l



SB 330/400/500 – 10 to 200 l and
SB 330 H-10 to 200 l
SB 550-1 to 5 l



Description	Item
Anti-extrusion ring	14
Oil valve complete, consisting of:	
Oil valve body	9
Valve	10
Damping sleeve	11
Safety nut	12
Valve spring	13
Anti-extrusion ring	14
Protection ring	15
O-ring (see above)	16
Spacer	17
Lock nut	18
Vent screw	19
Seal ring	20
Back-up ring	23
Seal kit * consisting of:	
O-ring (see above)	7
Protection ring	15
O-ring (see above)	16
Seal ring	20
Back-up ring	23
O-ring (see above)	27

Description	Item
Gas valve insert *	3
Repair kit * [2] consisting of:	
Bladder	2
Gas valve insert	3
Lock nut	4
Cap nut	5
Valve protection cap	6
O-ring 7.5 x 2.0 [1]	7
Protection ring	15
O-ring	16
Seal ring	20
Back-up ring	23
O-ring	27

* Recommended spare parts
[1] For code 663 and 665 different dimensions.
[2] When ordering please state smallest bladder connection port size.
Item 1 not available as spare part,
Item 25 has to be ordered separately
(see page 4)

3.4 REPAIR KITS

NBR, carbon steel
Nom. volume: 0.5 to 200 litres
Standard gas valve

Nom. volume [L]	Stock no.
1	02106261
2.5	02106200
4	02106204
5	02106208
6	02112100
10 *	03117512
10	02106212
13	02106216
20	02106220
24	02106224
32	02106228
50	02106252
60	03117513
80	03117514
100	03117515
130	03117516
160	03117517
200	03117558

*) slimline version for confined spaces
others on request

4. BLADDER ACCUMULATORS BACK-UP TYPE SB 330-...A2

4.1. CONSTRUCTION

Based on the bladder accumulators 20 - 50 l, the gas side of these accumulators is designed especially for connecting to nitrogen bottles.
A perforated anti-extrusion rod prevents damage to the bladder when the accumulator is charged.

This construction can also be used for the separation of fluids (taking into account the volume ratios valid for bladder accumulators).

4.2. DIMENSIONS

Nom. volume litres	Effect. gas volume litres	Weight kg	A max. mm
20	17.5	53.5	905
24	24	72	1070
32	32.5	89	1420
50	47.5	119.5	1930

4.3. SPARE PARTS

Description	Item
Repair kit * consisting of:	
Bladder	2
Lock nut	4
O-ring 7.5 x 2.0 [1]	7
Protection ring	15
O-ring 80 x 5 [1]	16
Seal ring	20
Back-up ring	23
O-ring 48 x 3 [1]	27
O-ring 22 x 2.5 [1]	31
O-ring 11 x 2 [1]	33
Anti-extrusion ring	14
Rod	30

* Recommended spares

[1] For code 663 and 665 different dimensions.

Item 1 not available as spare part.
Item 25 to be ordered separately (see page 4).
Item 32 type 1 Standard.

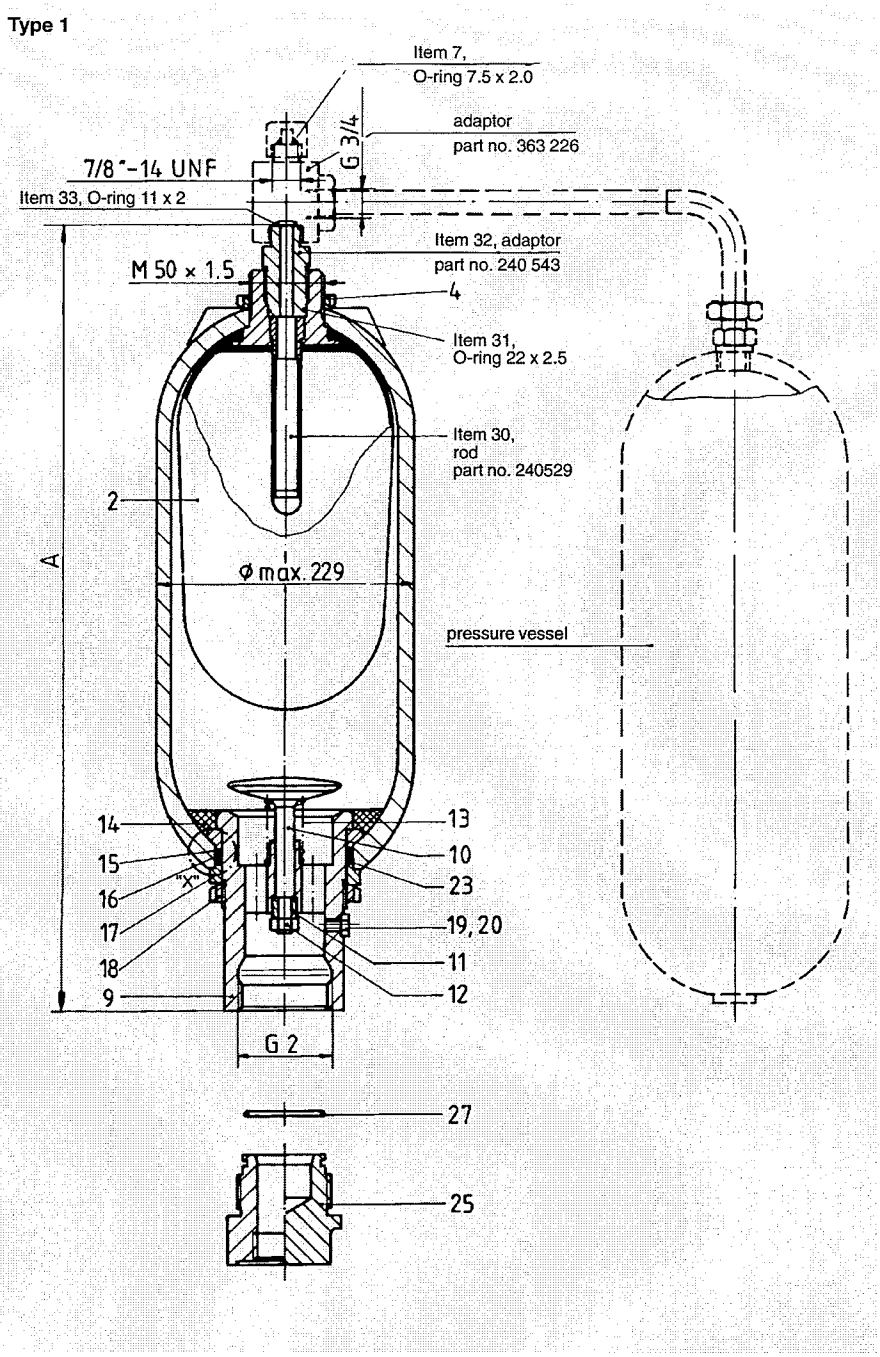
Other spare parts – see point 3.

4.4 REPAIR KITS

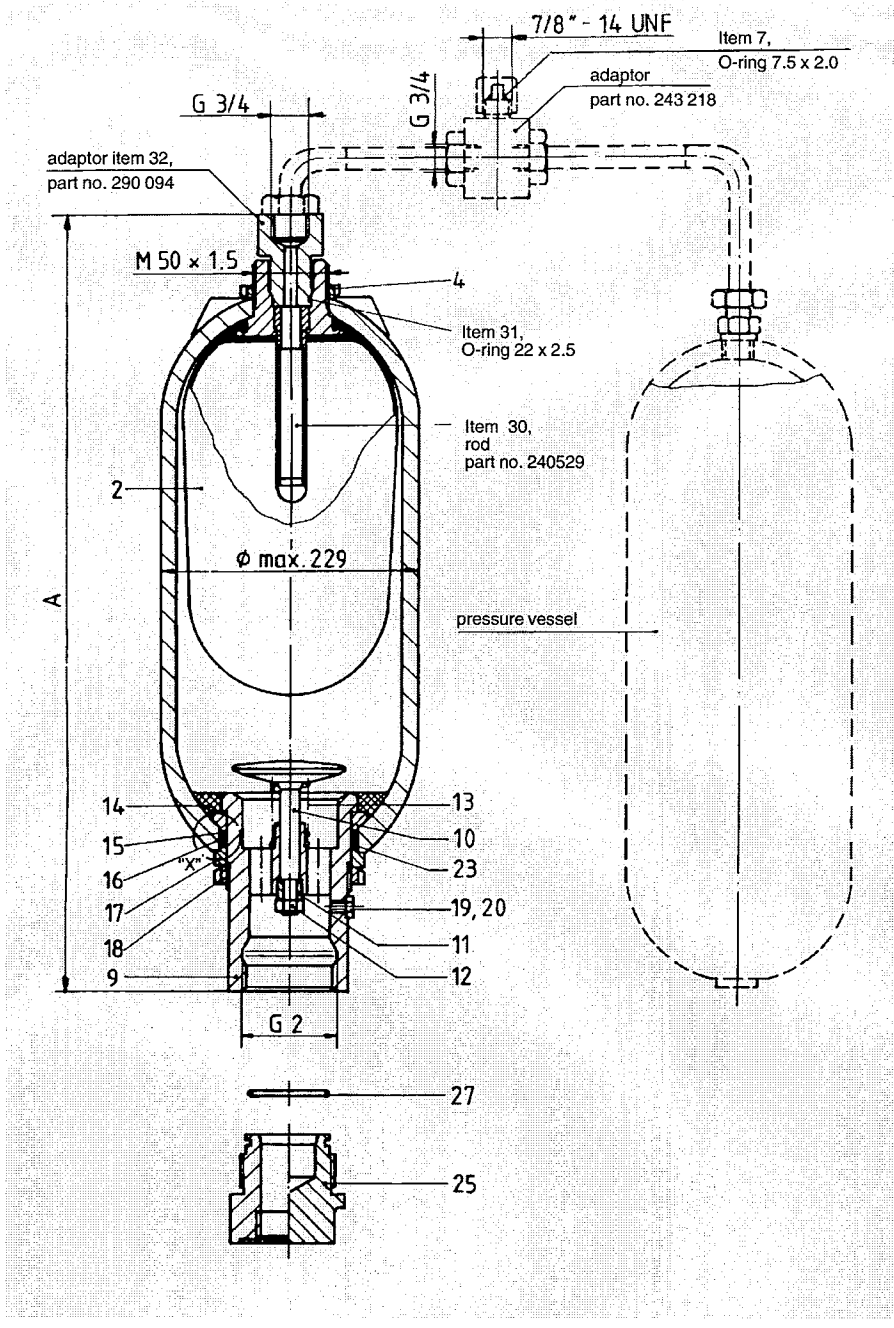
Designation	Stock no.
SB330/400A2-20 NBR	03119500
SB330/400A2-24 NBR	03119502
SB330/400A2-32 NBR	03119498
SB330/400A2-52 NBR	03119499

others on request

Type 1



Type 2



5. NOTE

The information in this brochure relates to the operating conditions and applications described.

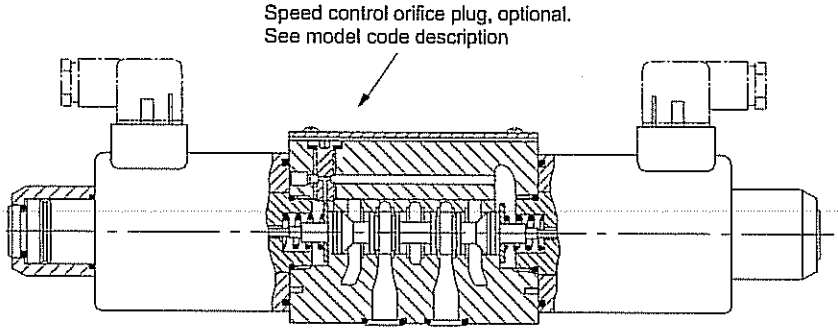
For applications or operating conditions not described, please contact the relevant technical department.

Subject to technical modifications.

Wet Armature Solenoid Operated Directional Control Valves

Model DG4V-5, 20 Series

Typical Construction of a Spring-Centered DC Valve with Variable Speed Pilot Control passage



General Description

Max. pressure ..... 315 bar (4500 psi)
Max. flow rates ..... Up to 120 L/min (32 USgpm), dependent on spool
Mounting surface .... ISO 4401 size 05
NFPA D02
DIN 24340 (NG10)

A range of four-port solenoid operated directional control valves with four-land spool design to facilitate provision of smooth, variable valve response speeds.

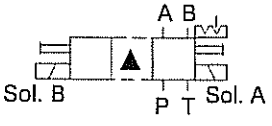
The range includes:

- AC and DC wet-armature solenoid options with ISO 4400 (DIN 43650) electrical connections and manual overrides.
- Variable speed changeover potential in all DC models; see "Response Times" section
- Many spool types; in spring-offset, spring-centered and detented arrangements.

5069.00/EN/0497/A

Functional Symbols

Double Solenoid Valves, Two-Position, Detented

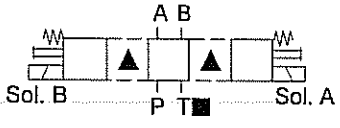


DG4V-5-*N valves

2

6

Double Solenoid Valves, Spring Centered



DG4V-5-*C valves

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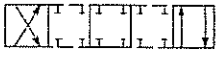

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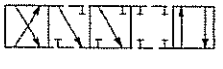

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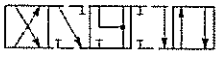

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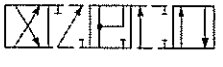

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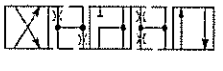

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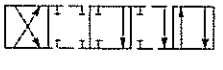

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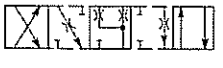

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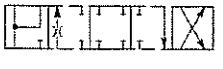
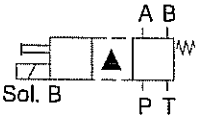


561

Single Solenoid Valves, Solenoid at Port A End



DG4V-5-*A valves

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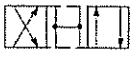

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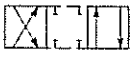

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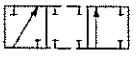

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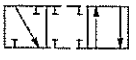

DG4V-5-*B valves

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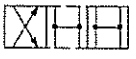

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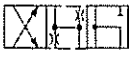

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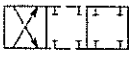

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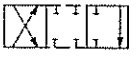

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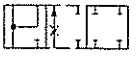
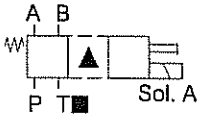


561

Single Solenoid Valves, Solenoid at Port B End



DG4V-5-*AL valves

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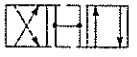

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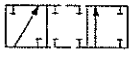

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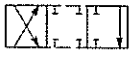

DG4V-5-*BL valves

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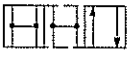

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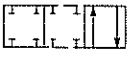

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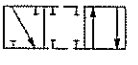

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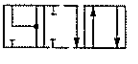

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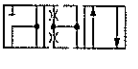

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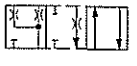

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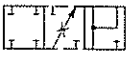


52

56

▲ *Transient condition only.*
■ *Both ports T_A and T_B are available.*

Model Code

(F13-) DG4V-5-* *(L) (J) (-**)- (V) M- (S6)- U - ** 6- 20- J****

1 2 3 4 5 6 7 8 9 10 11

1 Prefix, fluid compatibility

Blank = AC or DC-voltage models for petroleum oils, water-in-oil (invert) emulsions or phosphate esters.
AC-voltage models for water glycols.

F13 = DC-voltage models for water glycols.

2 Spool type

See "Functional Symbols" section

3 Spool spring arrangement

A = Spring-offset, end-to-end
AL = As "A" but left-hand build
B = Spring offset, end-to-center
BL = As "B" but left-hand build
C = Spring centered
N = Two-position, detented
See also "Functional Symbols" section

4 Spool design

J = All DC valves except "0A" spool/spring arrangements.
AC valves with "8B(L)" and "8C" spool/spring arrangements.

Omit for "0A" DC-valves and all AC valves except "8B(L)" and "8C" spool/spring arrangements

5 Manual override option

P = Standard overrides in both ends of single-solenoid valves
H = Water-resistant override(s) in solenoid end(s)▼
H2 = Water-resistant overrides in both ends of single-solenoid valves
Z = No overrides at either end

Omit for standard plain override(s) in solenoid end(s) only▼

▼ *No override in non-solenoid end of single-solenoid valves.*

6 Solenoid energization identity

V = Solenoid "A" is at port A end and/or solenoid "B" is at port B end, independent of spool type

Omit for US ANSI B93.9 standard requiring solenoid "A" to connect P to A when energized and/or solenoid "B" to connect P to B

7 Spool position indicator switch

S6 - LVDT type DC switch with Pg7 connector plug

8 Electrical connection(s)

U = ISO 4400 (DIN 43650) mounting(s) without plug(s)

9 Coil rating

A = 110V AC 50
C = 220V AC 50
ED = 240V AC 50
EK = 115V AC 60
EH = 230V AC 60
G = 12V DC
H = 24V DC
HL = 24V DC (32W)
OJ = 48V DC
P = 110V DC

10 Design number, 20 series

Subject to change. Installation dimensions unaltered for design numbers 20 to 29 inclusive

11 Spool speed control

J06 = 0,6 mm orifice
J08 = 0,8 mm orifice
J10 = 1,0 mm orifice
J12 = 1,2 mm orifice
J99 = no orifice. Must be specified where future fitting of orifice is required, see page A.11, "Spool Speed Control Orifice"

For Mounting Subplates and Fixing Bolt Kits

See catalogs 2425 and 2314.

For Electrical Plug(s)

See end of "Installation Dimensions" section.

Operating Data

Max. Pressures

Ports P, A and B .... 315 bar (4500 psi)
Ports T_A and T_B ..... 120 bar (1750 psi) for AC sol.
160 bar (2325 psi) for DC sol.

Control Data

For coil ratings see 8 in "Model Code" section.

Power Consumption

AC Solenoids

	AC 50 Hz	AC 60 Hz
Inrush, max. ▲VA	700	750
Steady-state ▼VA	375	440
Holding VA	105	130

All above values are RMS

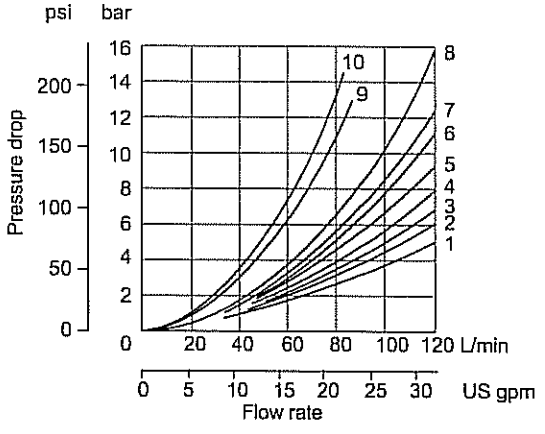
▲ *Armature fully retracted, 1st half-cycle.*
▼ *At start of normal working stroke of valve spool. Previously called "Inrush".*

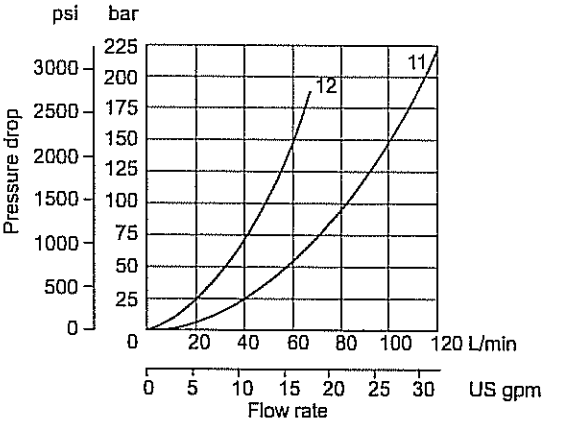
DC Solenoids

At rated voltage and wire temperature of 20°C (68°F):
Type HL 32W
Others 38-42W

Performance Data

Pressure Drops Typical with petroleum oil at 36 cSt (170 SUS) and a specific gravity of 0,87





Spool/spring code	Spool positions covered	P to A	P to B	A to T	B to T	P to T	A to B or B to A
0A(L)	Both	2	2	4	5	–	–
0B(L) & 0C	De-energized Energized	– 1	– 1	– 6	– 7	3▲ –	– –
1B(L) & 1C	De-energized Energized	– 1	– 2	– 6	– 4	6▼ –	– –
2A(L)	Both	3	3	5	6	–	–
2B(L) & 2C	All	2	2	4	5	–	–
2N	Both	3	3	5	6	–	–
3B(L) & 3C	De-energized Energized	– 2	– 3	5 6	– 5	– –	– –
6B(L) & 6C	De-energized Energized	– 3	– 3	5● 6	6▼ 7	– –	– –
6N	Both	4	4	4	5	–	–
7B(L) & 7C	De-energized Energized	3● 2	3▼ 2	– 5	– 6	– –	5∷ –
8B(L) & 8C	All	2	2	7	8	8	–
11B(L) & 11C	De-energized Energized	– 2	– 1	– 4	– 7	6● –	– –
22A(L)	Both	3	3	–	–	–	–
23A(L)	Both	3	3	5	6	–	–
31B(L) & 31C	De-energized Energized	– 3	– 2	– 4	6 7	– –	– –
33B(L) & 33C	De-energized Energized	– 2	– 2	12● 5	12▼ 6	– –	– –
34B(L) & 34C	De-energized Energized	– 2	– 2	11● 5	11▼ 6	– –	– –
52BL & 52C	All	7●	8	4	–	–	9∷
56BL & 56C	De-energized Energized	– 7●	– 8	8● 6	10▼ –	– –	– 9∷
521B & 521C	All	8	7▼	–	5	–	9∷
561B & 561C	De-energized Energized	– 8	– 7▼	10● –	8▼ 7	– –	– 9∷

▲ *A and B blocked* ▼ *A blocked* ● *B blocked* ∷ *P blocked*

Operating Data

Spool Position Indicator Models
Spool/spring arrangement types 0A (L), 2A(L), 22A(L)

DC model type "S6"

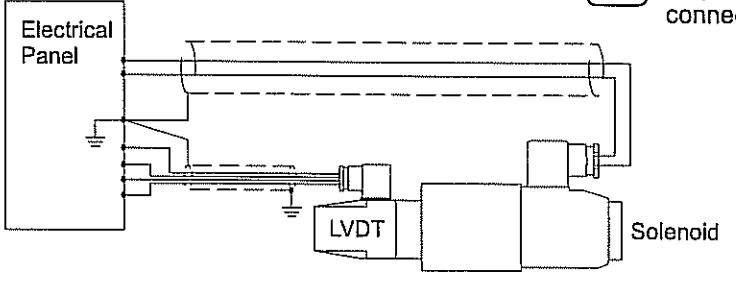
CE *This product has been designed and tested to meet specific standards outlined in the European Electromagnetic Compatibility Directive (EMC) 89/336/EEC, amended by 91/263/EEC, 92/31/EEC and 93/68/EEC, article 5. For instructions on installation requirements to achieve effective protection levels see this leaflet and the Installation Wiring Practices for Vickers Electronic Products leaflet 2468. Wiring practices relevant to this Directive are indicated by* ⚠ *Electromagnetic Compatibility (EMC).*

Input:	
Supply voltage	10 to 35V DC inclusive of a maximum 4V pk-to-pk ripple
Current, switch open	5 mA
Current, switch closed	255 mA
Output:	
Voltage	1V below input at maximum load
Maximum continuous current	250 mA
Maximum load impedance	136Ω at maximum input volts
Maximum switching frequency	10 Hz
Plug connections:	
Pin 1 (output 1)	Normally open (ie. not connected to pin 3)
Pin 2	Supply +ve
Pin 3	0V
Pin 4 (output 2)	Normally closed (ie. connected to pin 3)
Switching point	Within the spool spring offset condition •
Connector	Pg7 plug (supplied with valve)
Protection	Overload and short-circuit protected; self re-setting. IEC 144 class IP65 with connector correctly fitted.

• *Factory setting ensures this condition under all combinations of manufacturing tolerance and of temperature drift (see "Temperature Limits").*

Wiring Connections

Warning
All power must be switched off before connecting or disconnecting any plugs.



⏚ Customer's protective ground connection

WARNING: *Electromagnetic Compatibility (EMC)*

It is necessary to ensure that the unit is wired up in accordance with the connection arrangements shown above. For effective protection the user's electrical cabinet, the valve subplate or manifold and the cable screens should be connected to efficient ground points.
In all cases both valve and cable should be kept as far away as possible from any sources of electromagnetic radiation such as cables carrying heavy current, relays and certain kinds of portable radio transmitters, etc. Difficult environments could mean that extra screening may be necessary to avoid the interference.

Max. Flow Rates

Based on warm solenoid(s) operating at 10% below rated voltage.

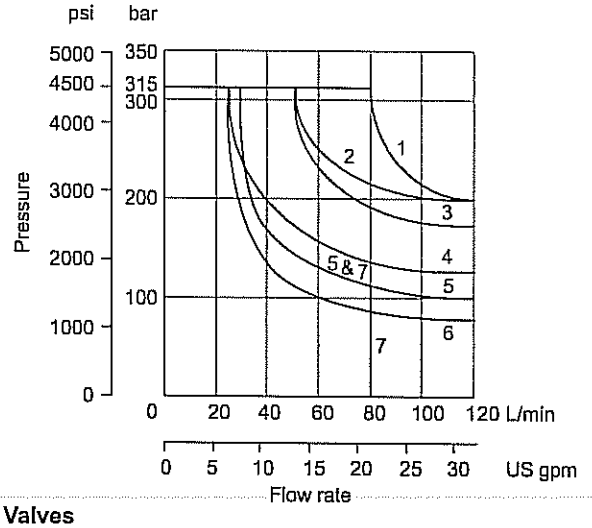
Flow limits applicable to following usages:

1. All valves except those with types 22, 52, 56, 521 and 561 spools having simultaneous equal flow rates from P to A or B and from B or A to T.
2. Valves with type 22 spools having flow from P to A or B, the other being blocked. T is drained at all times.
3. Valves with types 52, 56, 521 and 561 spools having one service port connected to the full bore end of a 2:1 area ratio double-acting cylinder and the other service port to the annulus end.
4. Valves with type 23 spools having single flow from A or B to T, P and the other service port being blocked.

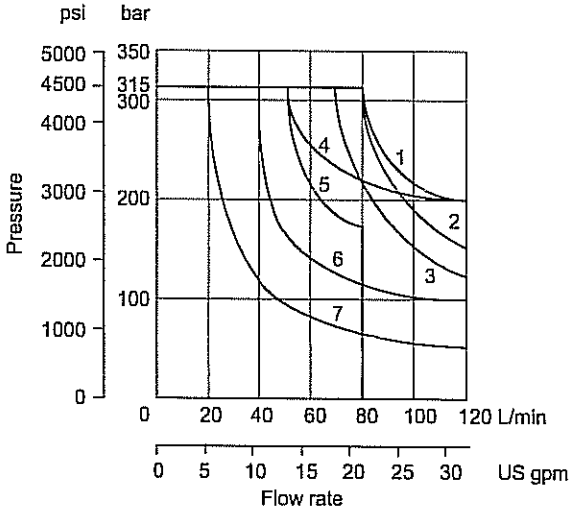
Consult Vickers with application details if any of the following are required:

a) Single flow path, i.e. P to A, P to B, A to T or B to T.
b) Substantially different simultaneous flow rates between P to A or B and B or A to T.
c) Spools as in 3 above are to be used with cylinder ratios greater than about 3:1 at low flow rates or 2:1 at high flow rates.

AC Solenoid Valves



DC Solenoid Valves



Spool/spring code	AC valve graph curve	DC valve graph curve
0A(L)	3	2
0B(L) & 0C	2	4
1B(L) & 1C	6	7
2A(L)	3	2
2B(L), 2C & 2N	1	1
3B(L), 3C, 6B(L) & 6C	4	6
6N	3	3
7B(L) & 7C	1	1
8B(L) & 8C	7	5
11B(L), 11C & 22A(L)	6	7
23A(L)	5	6
31B(L) & 31C	4	6
33B(L), 33C, 34B(L) & 34C	3	6
52B(L), 52C, 56BL, 56C, 521B, 521C, 561B & 561C	4	6

Response Times, Typical
Time taken from when signal is first applied at the solenoid until the spool completes its travel. Based on DG4V-5-2C at 60 L/min (16 USgpm) from P to A to B to T and at 160 bar (2320 psi) with petroleum oil at 36 cSt (168 SUS) and at 50°C (122°F):
AC energizing ..... 30 ms
AC de-energizing ..... 40 ms
DC energizing ..... 120 ms▲
DC de-energizing ..... 45 ms▲✳

✳ *In pure switched conditions, devoid of the effects of any suppression diodes and full-wave rectifiers.*

▲ *DG4V-5-2CJ valves. Longer response times can be obtained by fitting an orifice plug in a special pilot port, standard in all bodies. An orifice kit 459065, containing a selection of plugs of differing orifice size, can be ordered separately. Ask your Vickers representative for details.*

Hydraulic Fluids
Water glycols can be used with F13-prefix DC-voltage models or with non-prefix AC-voltage models. Non-prefix DC-voltage models and all AC-voltage models can be used with anti-wear hydraulic oils, water-in-oil emulsions, phosphate esters (not alkyl based).

The extreme operating viscosity range is from 500 to 13 cSt (2300 to 70 SUS) but the recommended running range is 54 to 13 cSt (245 to 70 SUS).

For further information about fluids see catalog 920.

Temperature Limits
Minimum ambient ..... –20°C (–4°F)
Maximum ambient:
AC 50 Hz valves ..... 50°C (122°F)
AC 60 Hz valves ..... 40°C (104°F)
DC valves ..... 70°C (158°F)

Fluid temperatures

	Petroleum oil	Water-containing
Min.	–20°C (–4°F)	+10°C (+50°F)
Max.*	+70°C (+158°F)	+54°C (+130°F)

* *To obtain optimum service life from both fluid and hydraulic system, 65°C (150°F) normally is the maximum temperature except for water-containing fluids.*

For synthetic fluids consult manufacturer or Vickers where limits are outside those for petroleum oil.

Whatever the actual temperature range, ensure that viscosities stay within the limits specified in the "Hydraulic Fluids" section.

Solenoid Surface Temperatures
Typical maximums at 20°C (68°F) ambient:
AC 50 Hz solenoids ..... 80°C (176°F)
AC 60 Hz solenoids ..... 92°C (197°F)
DC solenoids ..... 78°C (172°F)

Contamination Control Requirements
Recommendations on contamination control methods and the selection of products to control fluid condition are included in Vickers publication 9132 or 561, "Vickers Guide to Systemic Contamination Control". The book also includes information on the Vickers concept of "ProActive Maintenance". The following recommendations are based on ISO cleanliness levels at 2 µm, 5 µm and 15 µm. For products in this catalog the recommended levels are:

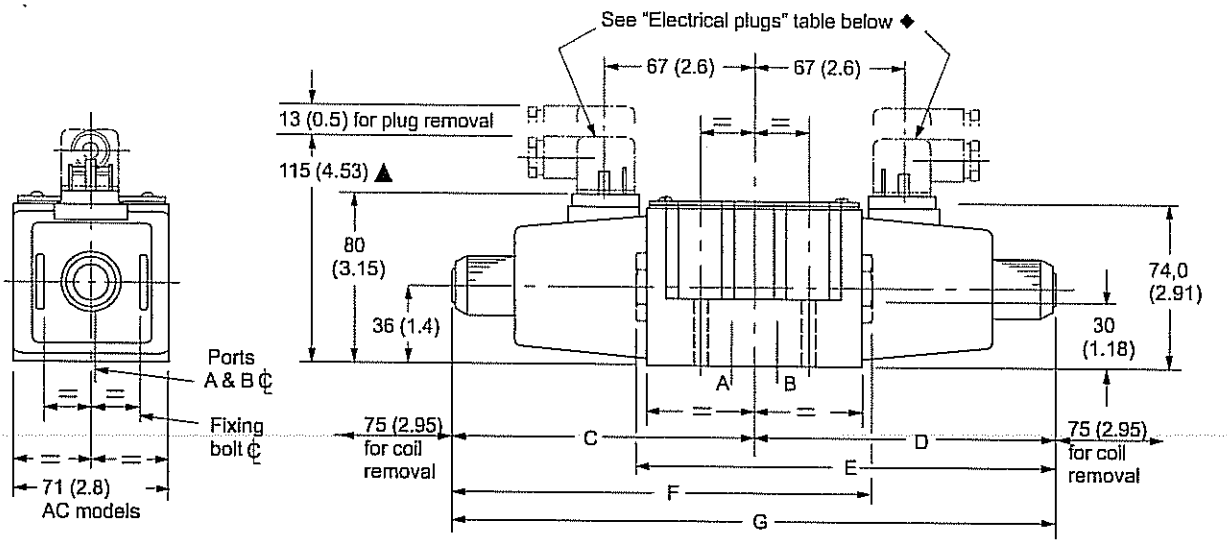
Up to 210 bar (3050 psi) **20/18/15**
Above 210 bar (3050 psi) **19/17/14**

Mass, Approx. kg (lb)
Single solenoid models,
AC coils 4,0 (8.8)
Single solenoid models,
DC coils 4,8 (10.6)
Double solenoid models,
AC coils 4,5 (9.9)
Double solenoid models,
DC coils 6,3 (13.9)

Installation Dimensions in mm (inches)

AC Solenoid Models

3rd angle projection

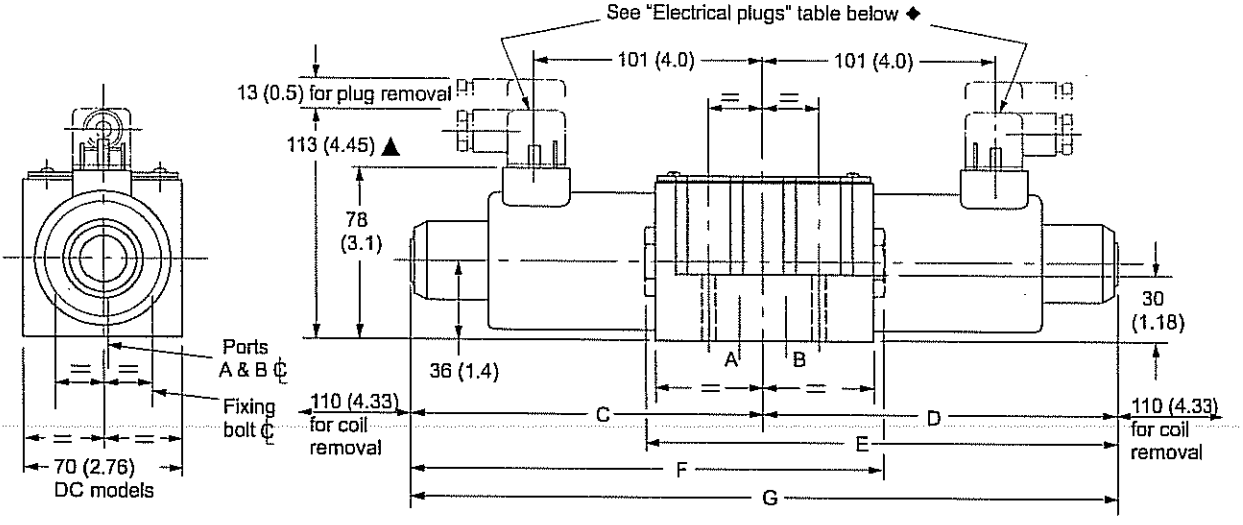


▲ *May vary according to plug source.*
◆ *The cable entry can be repositioned at 90° intervals from the position shown. This is done by reassembling the contact holder into the appropriate position inside the plug housing.*

Model	Solenoid at:	C	D	E	F	G
DG4V-5-*A(L)/B(L)(-Z)-(V)M	Port A end Port B end	123 (4.84) –	– 123 (4.84)	– 182 (7.17)	182 (7.17) –	– –
DG4V-5-*A(L)/B(L)-H2-(V)M	Port A end Port B end	138 (5.43) –	– 138 (5.43)	– 223 (8.78)	223 (8.78) –	– –
DG4V-5-*A(L)/B(L)-P-(V)M	Port A end Port B end	123 (4.84) –	– 123 (4.84)	– 195 (7.68)	195 (7.68) –	– –
DG4V-5-*C/N(-Z)-(V)M	Both ends	123 (4.84)	123 (4.84)	–	–	246 (9.68)
DG4V-5-*C/N-H-(V)M	Both ends	138 (5.43)	138 (5.43)	–	–	276 (10.87)

DC Solenoid Models

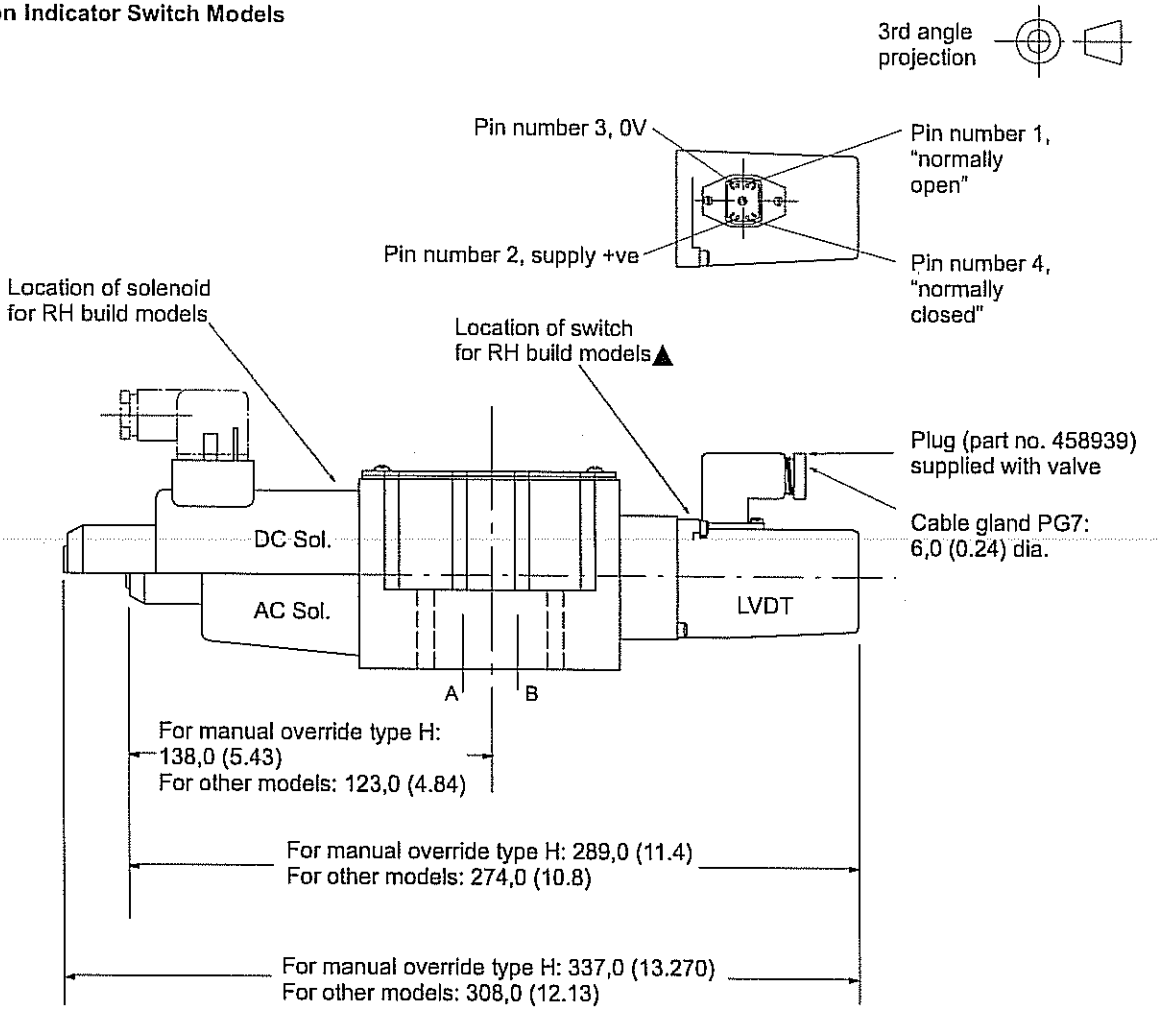
3rd angle projection



▲ *May vary according to plug source.*
◆ *The cable entry can be repositioned at 90° intervals from the position shown. This is done by reassembling the contact holder into the appropriate position inside the plug housing.*

Model	Solenoid at:	C	D	E	F	G
DG4V-5-*A(L)/B(L)-(-Z)-(V)M	Port A end Port B end	156 (6.14) –	– 156 (6.14)	– 215 (8.46)	215 (8.46) –	– –
DG4V-5-*A(L)/B(L)-H2-(V)M	Port A end Port B end	185 (7.28) –	– 185 (7.28)	– 270 (10.63)	270 (10.63) –	– –
DG4V-5-*A(L)/B(L)-P-(V)M	Port A end Port B end	156 (6.14) –	– 156 (6.14)	– 228 (8.98)	228 (8.98) –	– –
DG4V-5-*C/N(-Z)-(V)M	Both ends	156 (6.14)	156 (6.14)	–	–	312 (12.28)
DG4V-5-*C/N-H-(V)M	Both ends	185 (7.28)	185 (7.28)	–	–	370 (14.57)

Spool Position Indicator Switch Models



▲ *For LH models ("L" in model code location 3) solenoid and switch locations are reversed*

⚠ Wiring: See warning note on page A.5

Model (see also [5] in "Model Codes")	Spool types	Solenoid identity Port A end	Port B end
DG4V-5-*A(J)/B(J)(-**)-M	All except 8	B	–
DG4V-5-*A(J)/B(J)(-**)-VM	All except 8	A	–
	8 only	–	B
DG4V-5-*AL(J)/BL(J)(-**)-M	All except 8	–	A
DG4V-5-*AL(J)/BL(J)(-**)-VM	All except 8	–	B
	8 only	A	–
DG4V-5-*C(J)/N(J)(-**)-M	All except 8	B	A
DG4V-5-*C(J)/N(J)(-**)-VM	All spools	A	B

Electrical plug(s) (without indicator light) to DIN 43650.

Must be ordered separately by part number(s).

Part No.	Color	Solenoid /LVDT identity	Cable gland
710775	Black	B	Pg11 Ø6-10 mm
710776	Gray	A	Pg11 Ø6-10 mm
458939	Gray	LVDT	Pg7 Ø3,5-6 mm

Spool Speed Control Orifice

For fine tuning of valve spool speed. Only applicable to valves already fitted with an orifice or blank plug, see model code, page A.3.

Warning - Changing procedure

Before breaking a circuit connection make certain that power is off and system pressure has been released. Lower all vertical cylinders, discharge accumulators and block any load whose movement could generate pressure. Plug all removed units and cap all lines to prevent entry of dirt into the system.

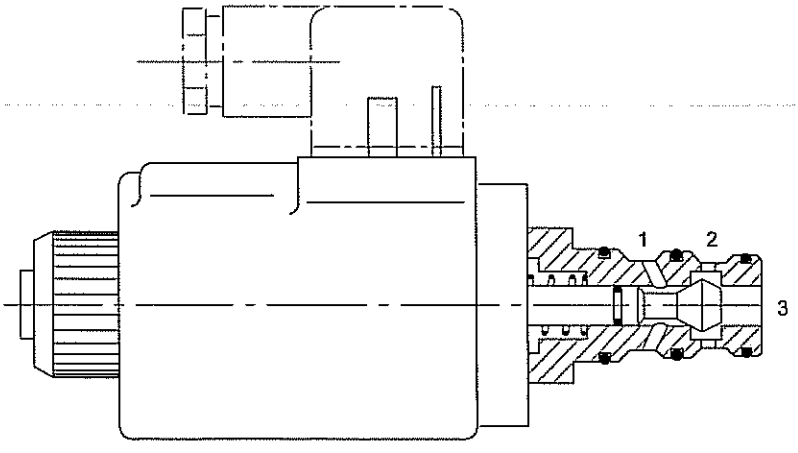
Orifice Kit

Orifice kits must be ordered separately, part number 02-350116.
Kit comprises 1 off each of the following:
0,6 mm dia
0,8 mm dia
1,0 mm dia
1,2 mm dia
Blank

Solenoid Operated Poppet-Type Directional Control Valves

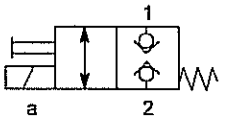
Cartridge Models CVUA-6-PD
Gasket Mounted Models DG3/4VP-3

Construction of a Typical 3 Way/2 Position Cartridge Type Valve, Model CVUA-6-PDN-3-M-U

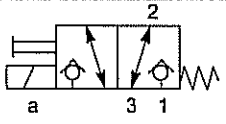


Functional Symbols

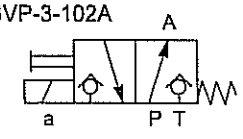
CVUA-6-PD*-2



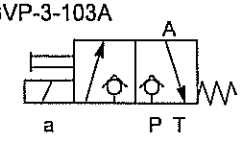
CVUA-6-PD*-3



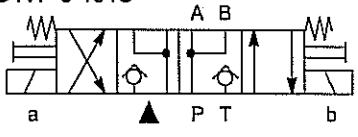
DG3VP-3-102A



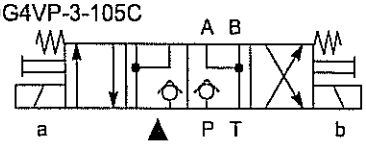
DG3VP-3-103A



DG4VP-3-104C



DG4VP-3-105C



▲ *This spool position is achieved only when both solenoids are energized simultaneously and remain so.*

Note: ◇ No leakage in either direction

↕ Through flow in both directions

Basic Characteristics

Max. pressure ..... 315 bar (4500 psi)
Max. flow rates ..... Up to 20 L/min (32 USgpm)
Mounting surface for DG*VP models ..... ISO 4401 size 03
NFPA D01
DIN 24340 (NG6)

General Description

These new solenoid operated poppet valves are used mainly for starting, stopping and controlling the direction of linear and rotary actuators or for use as a pilot valve. The gasket mounted types can also be used for controlling the pilot functions of cartridge valves to ISO 7368 (DIN 24342) (see catalog 2378).

All valves are of a "zero leakage design" which is the major design feature of poppet-type valves. The valves are available as either gasket mounted or cartridge insert type. The latter requires a housing having a purpose-formed recess (see recess hole drawing and special tool note).

Advantages

- Zero internal leakage in closed position
- Fast consistent response times
- Cost-efficient high pressure capability
- Simple assembly and installation
- Fast and easy servicing

GB-642A

Model Codes

For CVUA Cartridge Valves

(F3-)CVUA-6-PD * - * -M-U-* -1*

1 4 5 6 7

For DG*VP Valves

(F3-)DG* VP-3-10 -VM-U-* -1***

1 2 3 6 7

1 Prefix, fluid compatibility

Blank = For petroleum oils, water glycols and invert emulsions

F3 = For phosphate esters, petroleum oils, water glycols and invert emulsions

2 Function

3 = Three-way

4 = Four-way

3 Spool and spring arrangement

102A = Normally open, spring offset; option for DG3VP models

103A = Normally closed, spring offset; option for DG3VP models

104C = Normally open, spring centered; option for DG4VP models

105C = Normally closed, spring centered; option for DG4VP models

4 Mounting flange type

N = Narrow thickness flange

W = Wide thickness flange

5 Function

2 = Two-way

3 = Three-way

6 Coil rating

B = 110 V AC 50/115 V AC 60

D = 220 V AC 50/230 V AC 60

G = 12 V DC

H = 24 V DC

7 Design number, 10 series

Subject to change. Installation dimensions unaltered for design numbers 10 to 19 inclusive.

For Electrical Plugs

See "Installation Dimensions" section.

For Tool Kits for CVUA Valves

See "Installation Dimensions" section.

For Mounting Subplates and Bolt Kits for DG*VP Models

See catalogs 2425 and 2314.

Note: CVUA valves are supplied complete with mounting flanges and metric fixing bolts.

Operating Data

Pressure and Flow Limits

Max. Pressure

Non-F3-Prefix Models:

For < 10 switching cycles/min ..... 315 bar (4500 psi)

For 10 to 180 switching cycles/min ..... 210 bar (3000 psi)

F3-Prefix Models:

Up to 180 switching cycles/min ..... 210 bar (3000 psi)

Note: For all valves lower limits may apply if high-water-based fluids (e.g. 5%/95% oil-in-water emulsions) are to be used; contact your Vickers representative.

Max. Flow Rate ..... Up to 20 L/min (5.3 USgpm)

Control Data

Rated Power Supply

See "Model Codes" section.

Power Consumption, AC Solenoids

Inrush, max.▲ VA 396

Steady-state ▼ VA 198

Holding VA 57

All above values are RMS

▲ *Armature fully retracted, 1st half-cycle.*

▼ *At start of normal working stroke of valve spool. Previously called "Inrush".*

Power Consumption, DC Solenoids

At rated voltage and wire temperature of 20°C (68°F) 38W

Relative Duty Factor

100% continuous rating

Type of Protection

Weatherproof to IEC 144 Class IP65

Winding insulation to Class H

Epoxy resin to Class F

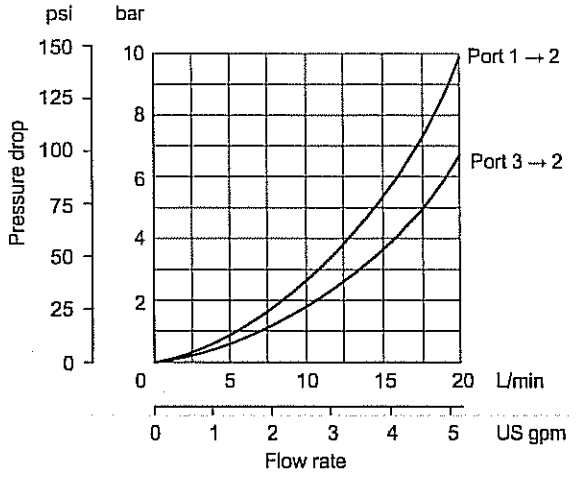
Permissible Voltage Fluctuation

±5% of rated voltage

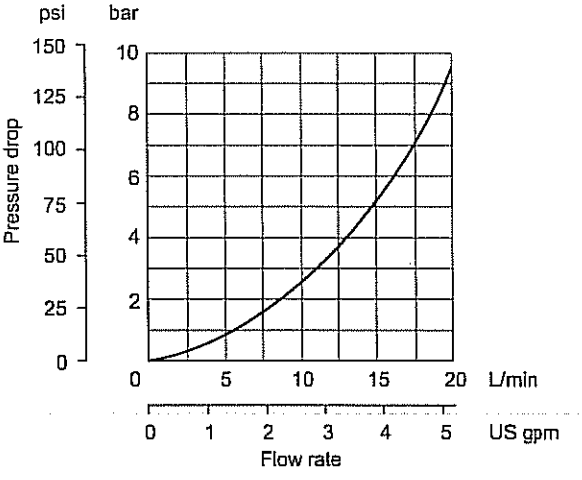
Performance Data

Pressure Drop Data
Typical with hydraulic petroleum oil at 36 cSt (170 SUS) and at 50°C (122°F)

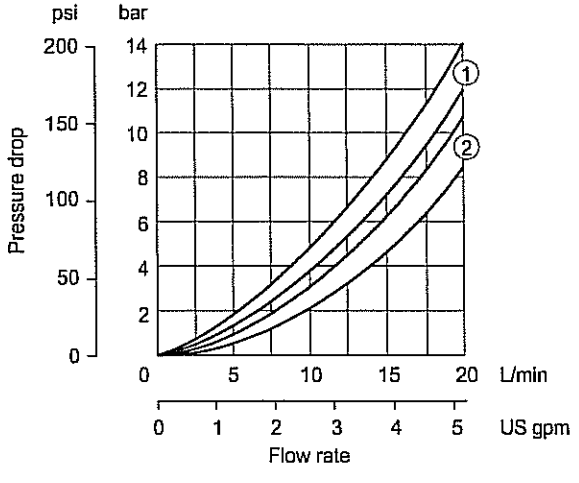
CVUA-6-PD*-3 Models



CVUA-6-PD*-2 Models



DG3VP-3 and DG4VP-3 Models



Model	Curve for flow: P to A	P to B	A to T	B to T
DG3VP-3-102A	②	–	①	–
DG3VP-3-103A	①	–	②	–
DG4VP-3-104C	②	②	①	①
DG4VP-3-105C	①	①	②	②

Response Times
Time taken from when signal is first applied at solenoid until armature completes its travel. Based on average conditions with warm solenoids at 95% rated voltage:
AC and DC energizing ..... 150 ms
AC and DC* de-energizing ..... 85 ms

* *In pure switched circuit conditions devoid of the effects of any suppression diodes and full-wave rectifiers.*

Hydraulic Fluids
All valves can be used with anti-wear hydraulic oils, water-in-oil emulsions and water glycols. Add prefix "F3" to model designation when phosphate ester (not alkyl-based) or chlorinated hydrocarbons are to be used.

The valves are also suitable for use with high water-based fluids (95% water, 5% oil) up to 200 bar.

The extreme operating viscosity range is from 300 to 13 cSt (1460 to 70 SUS) but the recommended running range is 54 to 13 cSt (250 to 70 SUS).

For further information about fluids see catalog 920.

Temperature Limits
Ambient min. ..... –20°C (–4°F)
Ambient max. ..... +70°C (158°F)

Fluid temperature

	Petroleum oil	Water-containing
Min.	–20°C (–4°F)	+10°C (+50°F)
Max.*	+70°C (+158°F)	+54°C (+130°F)

* *To obtain optimum service life from both fluid and hydraulic system, 65°C (150°F) normally is the maximum temperature except for water-containing fluids.*

For synthetic fluids consult manufacturer and your Vickers representative where limits are outside those for petroleum oil.

Whatever the actual temperature range, ensure that viscosities stay within the limits specified in the "Hydraulic Fluids" section.

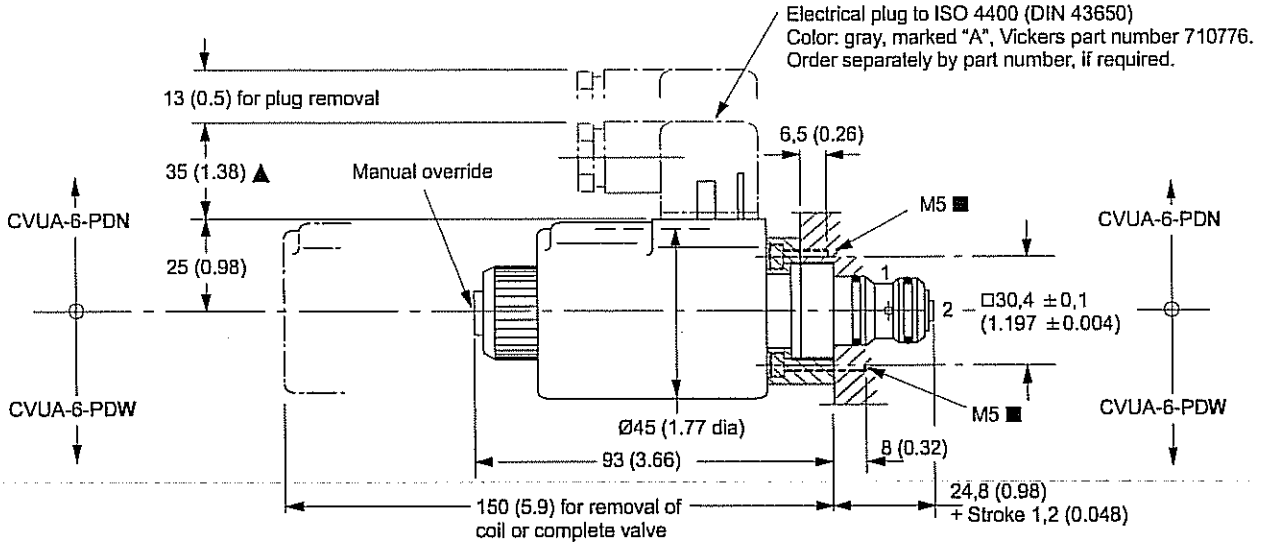
Contamination Control Requirements
Recommendations on contamination control methods and the selection of products to control fluid condition are included in Vickers publication 9132 or 561, "Vickers Guide to Systemic Contamination Control". The book also includes information on the Vickers concept of "ProActive Maintenance". The following recommendations are based on ISO cleanliness levels at 2 µm, 5 µm and 15 µm. For products in this catalog the recommended levels are:

Up to 210 bar (3050 psi) **20/18/15**
Above 210 bar (3050 psi) **19/17/14**

Installation Dimensions in mm (inches)

Model Types:
CVUA-6-PDN-2 and CVUA-6-PDW-2

3rd angle projection



▲ *May vary depending on plug source.* ■ *Torque to 4-6 Nm (35-53 lbf.in)*

Recess Dimensions

Notes (metric dimensions)

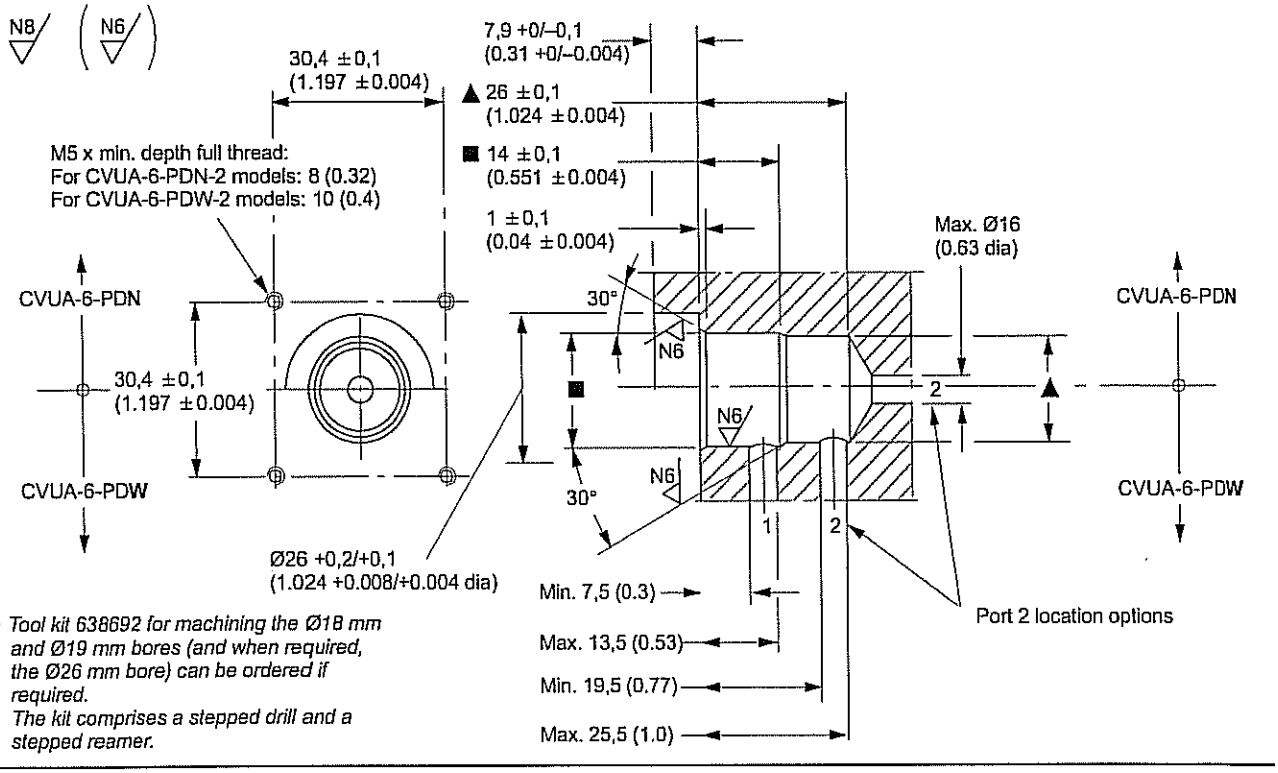
▲ Ø18 +0/–0,2 x 26 ±0,1 deep:
Ream Ø18 H7 x 20 deep min. ◆

■ Ø19 +0/–0,2 x 14 ±0,1 deep:
Ream Ø19 H7 x 8 deep min. ◆

Notes (inch dimensions)

▲ Diameter 0.709 +0/–0.008 x 1.024 ±0.004 deep:
Ream Ø18 mm H7 x 0.79 deep min. ◆

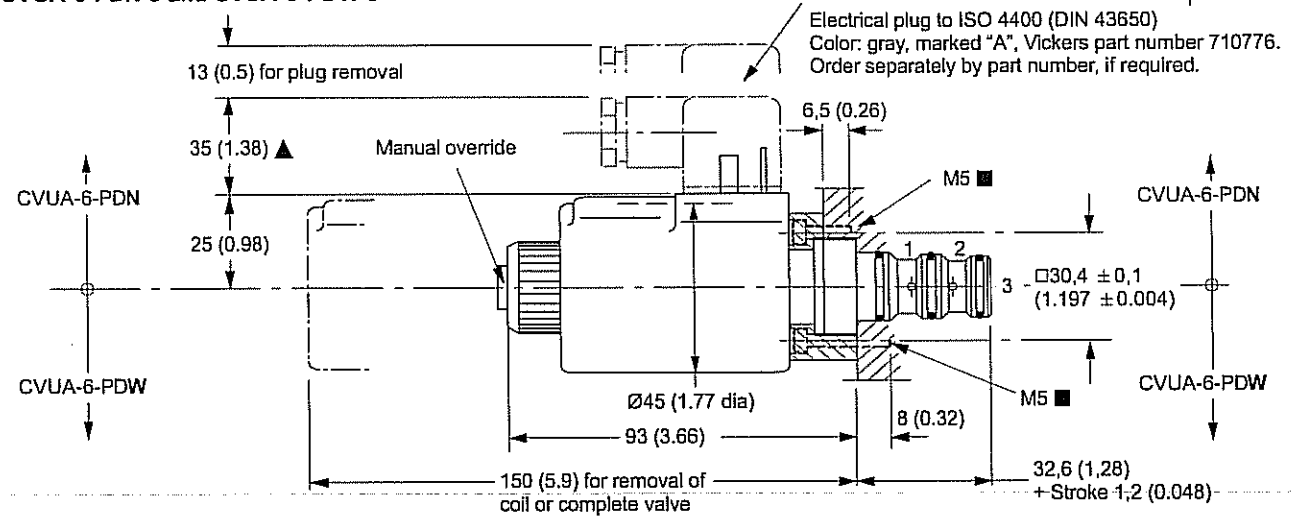
■ Diameter 0.748 +0/–0.008 x 0.551 ±0.004 deep:
Ream Ø19 mm H7 x 0.32 deep min. ◆



◆ *Tool kit 638692 for machining the Ø18 mm and Ø19 mm bores (and when required, the Ø26 mm bore) can be ordered if required.*
The kit comprises a stepped drill and a stepped reamer.

Model Types:
CVUA-6-PDN-3 and CVUA-6-PDW-3

3rd angle projection



▲ *May vary depending on plug source.* ■ *Torque to 4-6 Nm (35-53 lbf.in)*

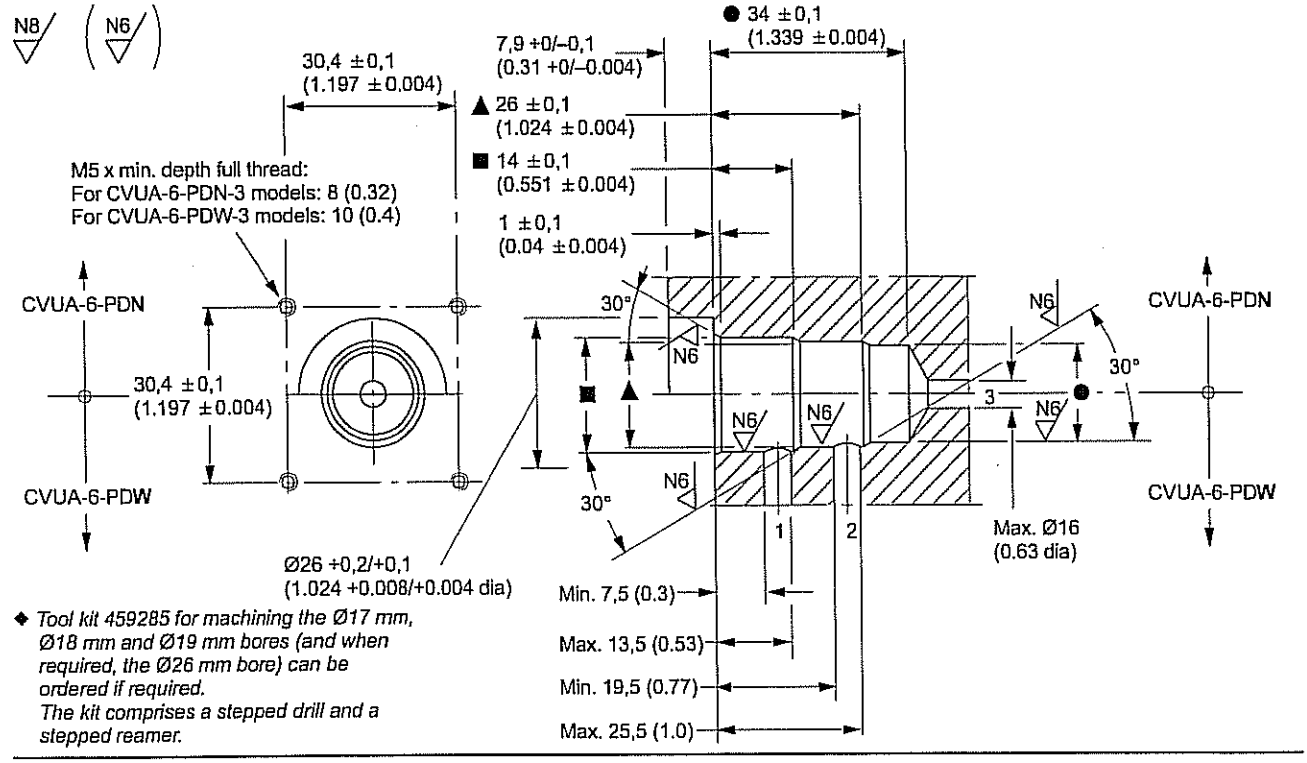
Recess Dimensions

Notes (metric dimensions)

- ● Ø17 +0/–0,2 x 34 ±0,1 deep: Ream Ø17 H7 x 32,5 deep min. ◆
- ▲ Ø18 +0/–0,2 x 26 ±0,1 deep: Ream Ø18 H7 x 20 deep min. ◆
- ■ Ø19 +0/–0,2 x 14 ±0,1 deep: Ream Ø19 H7 x 8 deep min. ◆

Notes (inch dimensions)

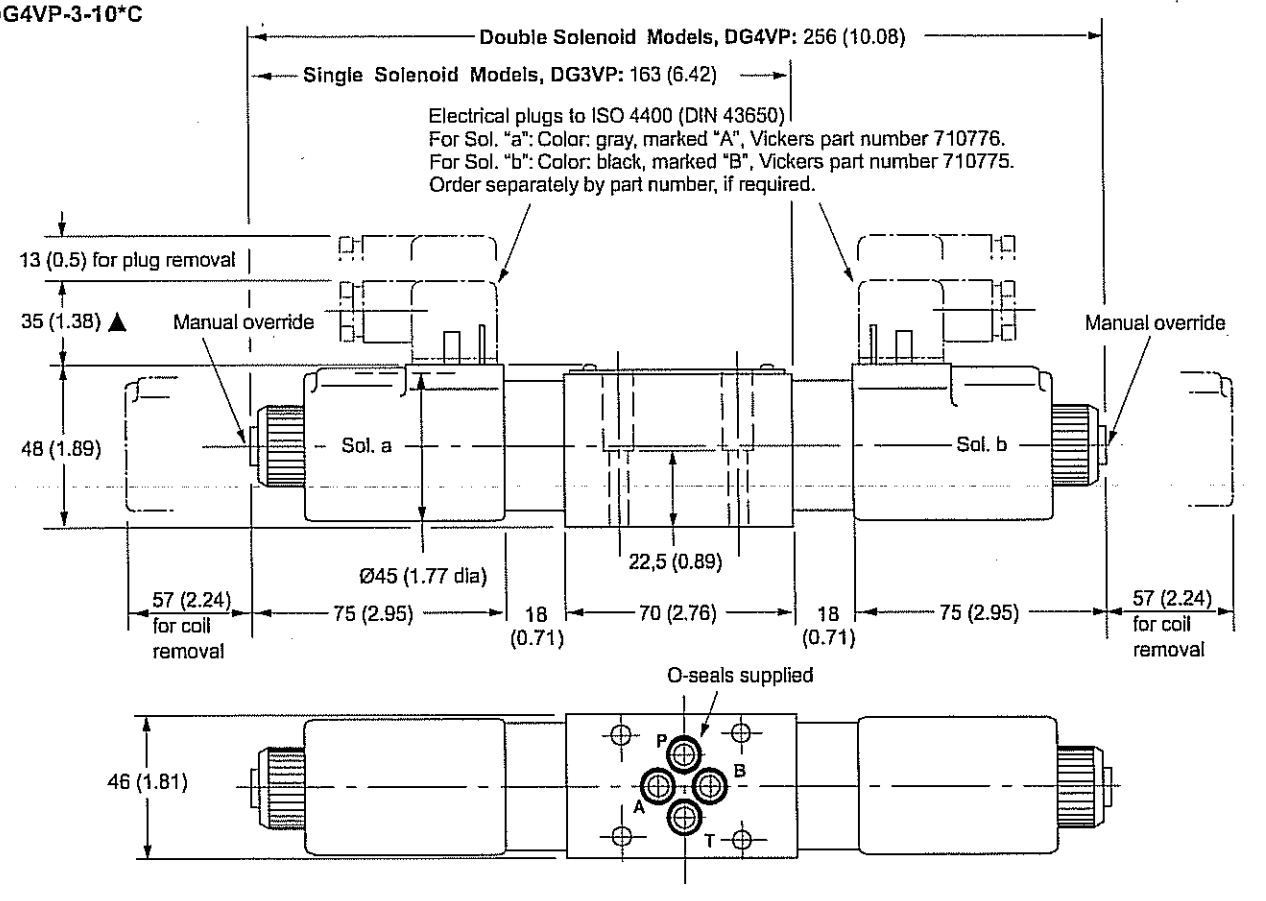
- ● Diameter 0.669 +0/–0.008 x 1.339 ±0.004 deep: Ream Ø17 mm H7 x 1.28 deep min. ◆
- ▲ Diameter 0.709 +0/–0.008 x 1.024 ±0.004 deep: Ream Ø18 mm H7 x 0.79 deep min. ◆
- ■ Diameter 0.748 +0/–0.008 x 0.551 ±0.004 deep: Ream Ø19 mm H7 x 0.32 deep min. ◆



◆ *Tool kit 459285 for machining the Ø17 mm, Ø18 mm and Ø19 mm bores (and when required, the Ø26 mm bore) can be ordered if required.*
The kit comprises a stepped drill and a stepped reamer.

Model Types:
DG3VP-3-10*A and
DG4VP-3-10*C

3rd angle projection



For details of mounting interface to ISO 4401, size 03, see catalog 2425.
For details of Vickers mounting bolt kits, see catalog 2314.

Mass, Approx. kg (lb)

CVUA-6-PD*-2-M-U-*-10 .... 0,85 (1.9)
CVUA-6-PD*-3-M-U-*-10 .... 0,86 (1.9)
DG3VP-3-10*A-VM-U-*-10 ... 1,75 (3.8)
DG4VP-3-10*C-VM-U-*-10 ... 2,50 (5.5)

Spare Parts Information

The only replacement parts available for these valves are as follows:

Seal kit	Part number
F3-prefix valves	638532
Non-F3 valves	992686

Solenoid Coils

Coil code	Coil rating	Part number
B	110V AC 50/115V AC 60	617947
D	220V AC 50/230V AC 60	617948
G	12V DC	617945
H	24V DC	617946

Electrical Plugs, ISO 4400 (DIN 43650)
Gray, marked "A" 710775
Black, marked "B" 710776

Tool Kits
For machining housing bores for:
CVUA-6-PD*-2 valves ..... Kit 638692
CVUA-6-PD*-3 valves ..... Kit 459285

Ordering Procedure

Order by full model designation or part number e.g.
CVUA-6-PDN-2-M-U-B-10 valve
710775 plug, gray marked "A"
638692 tool kit.

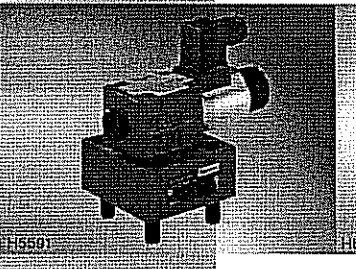
Rexroth
Bosch Group

2-way cartridge valves
Directional functions
Cartridge valves and control covers

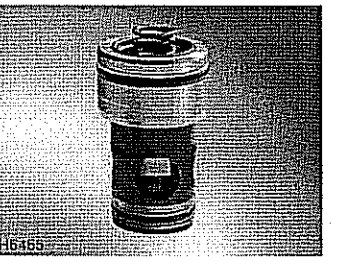
Types LC and LFA

Sizes 16 to 160
Component series 2X, 6X, 7X
Maximum operating pressure 420 bar
Maximum flow 25000 L/min

RE 21010/03.05 1/68
Replaces: 02.03



Control cover type LFA 25 WEA-7X/... with directional valve type 4WE 6 D6X/EG24N9K4 and cable socket



Cartridge valve type LC 25 A40E7X/...

Table of contents

Contents **see page 2**

Features

- Valve poppet with or without damping nose
- 2 area ratios
- 4 different springs
- 4 stroke limiters
- Control cover with integrated poppet valve
- Control cover with integrated shuttle valve
- Control cover for mounting directional spool valves with or without integrated shuttle valve
- Control cover with or without limit switch monitoring
- Further information:

Pilot control valves	Size 6	Size 10
Directional spool valve type WE	RE 23178	RE 23327
Directional poppet valve type SEW	RE 22058	RE 22075
Directional poppet valve type SED	RE 22049	RE 22045

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Function, sections, symbol

2-way cartridge valves are designed as elements for insertion into compact blocks. The power part with ports A and B is installed in a mounting cavity, which is standardised according to DIN ISO 7368, in the block and sealed by means of a cover. In most cases, the cover forms at the same time the connection between the control section of the power part and the pilot control valves. By controlling the power part with appropriate pilot control valves, it can perform pressure control, directional and throttling functions or a combination of these. Particularly economic solutions can be achieved by adapting the sizes to the different flows in the individual channels of an actuator. A very cost-efficient solution can be obtained, if several functions are assigned to the power part of an element.

Directional function

2-way cartridge valves mainly consist of a control cover (1) and a cartridge element (2). The control cover is provided with pilot bores and, depending on the required overall function, optionally a stroke limiter, a hydraulically controlled directional poppet valve or a shuttle valve. Moreover, electrically operated directional spool valves or directional poppet valves can be mounted onto the control cover. The cartridge consists of a bushing (3), a ring (4) (up to size 32 only), a valve poppet (5), optionally with damping nose (6) or without damping nose (7) and a closing spring (8).

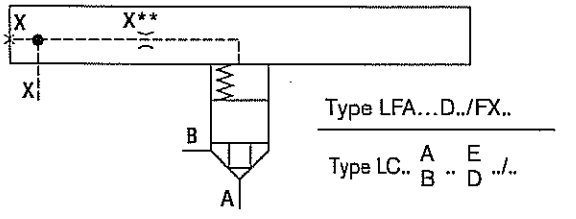
Function

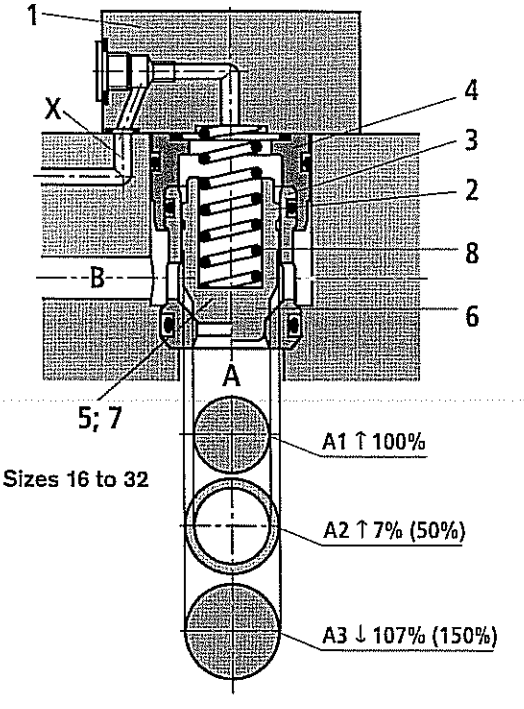
2-way cartridge valve operate in dependence upon pressure. Three pressurised areas are essential for the function: A1, A2, A3. The area of the valve seat is always taken as 100%. As a result of the stepping, the annulus area A2 is 7% or 50% of area A2, depending on the version. Consequently, the area ratio A1: A2 is either 14.3:1 or 2:1. Area A3 is equal to the sum of areas A1 + A2. Due to the different area ratios A1: A2 and the resulting different annulus areas (A2), area A3 is either 107% or 150% of area A1 on the seat that is assumed to be 100%.

The following is generally valid:

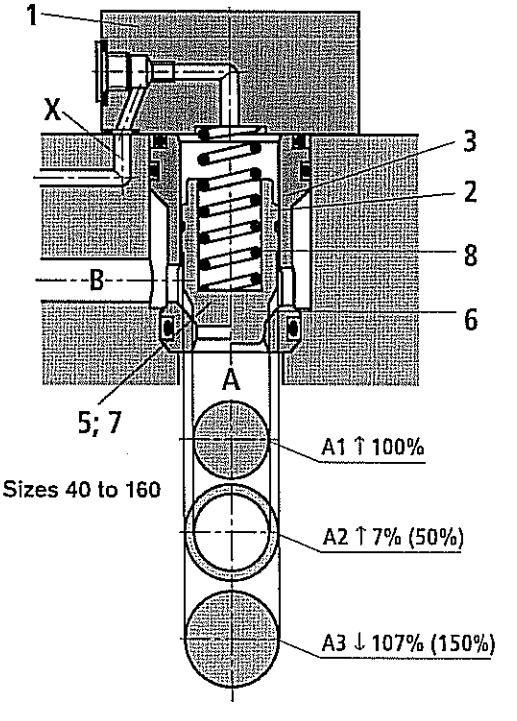
Areas A1 and A2 act in the direction of opening. Area A3 and the spring act in the direction of closing. The effective direction of the force resulting from the opening and closing forces determines the spool position of the 2-way cartridge valve.

The medium can flow through 2-way cartridge valves from A to B or from B to A. When area A3 is pressurised due to the pilot oil flow from channel B or external pilot oil supply, channel A is leak-free closed.



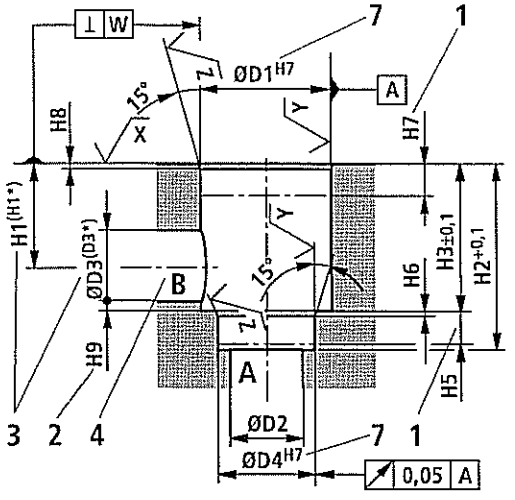


Sizes 16 to 32



Sizes 40 to 160

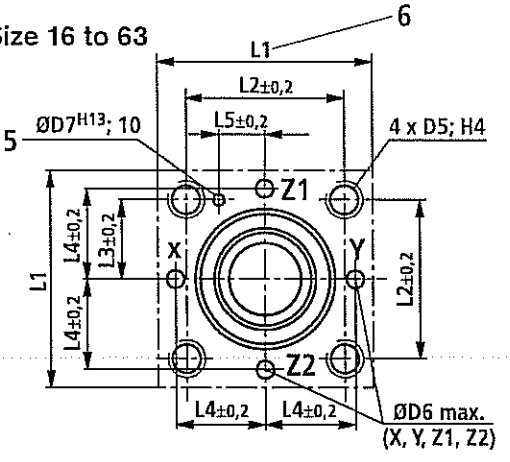
Mounting cavity and connection dimensions to DIN ISO 7368 (except for sizes 125 and 160)
(nominal dimensions in mm)



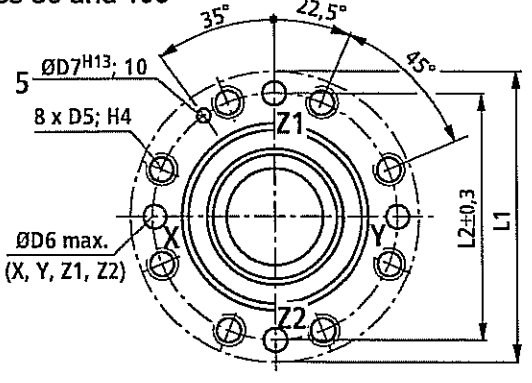
√X = √Rz1max 4
√Y = √Rz1max 8
√Z = √Rz1max 10

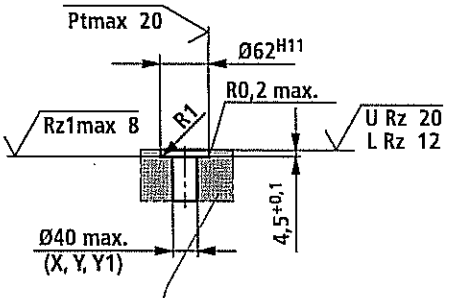
For indication of dimensions and explanation of positions, see page 9!

Size 16 to 63

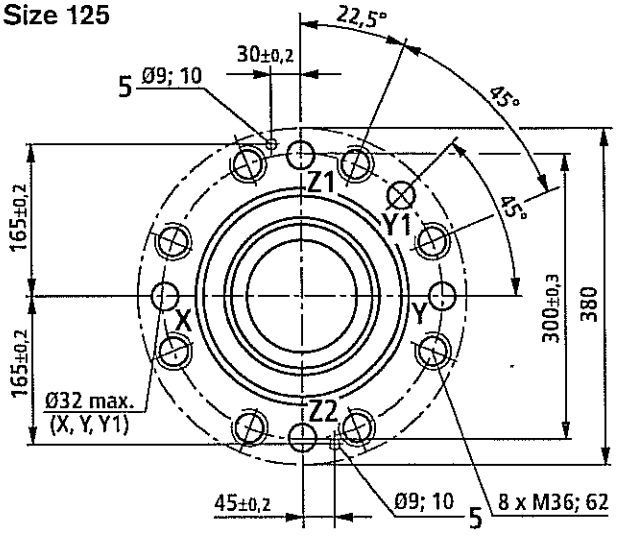


Sizes 80 and 100

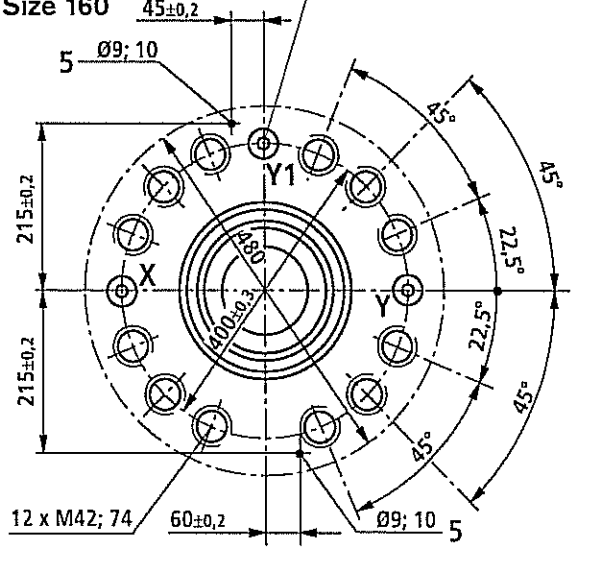




Size 125



Size 160



Mounting cavity and connection dimensions to DIN ISO 7368 (except for sizes 125 and 160) (nominal dimensions in mm)

Size	16	25	32	40	50	63	80	100	125	160
ØD1	32	45	60	75	90	120	145	180	225	300
ØD2	16	25	32	40	50	63	80	100	150 [1]	200 [1]
ØD3	16	25	32	40	50	63	80	100	125	200
(ØD3*)	25	32	40	50	63	80	100	125	150	250 [1]
ØD4	25	34	45	55	68	90	110	135	200	270
ØD5	M8	M12	M16	M20	M20	M30	M24	M30	–	–
ØD6 [1]	4	6	8	10	10	12	16	20	–	–
ØD7	4	6	6	6	8	8	10	10	–	–
H1	34	44	52	64	72	95	130	155	192	268
(H1*)	29.5	40.5	48	59	65.5	86.5	120	142	180	243
H2	56	72	85	105	122	155	205	245	$300^{+0.15}$	$425^{+0.15}$
H3	43	58	70	87	100	130	$175^{\pm0.2}$	$210^{\pm0.2}$	$257^{\pm0.5}$	$370^{\pm0.5}$
H4	20	25	35	45	45	65	50	63	–	–
H5	11	12	13	15	17	20	25	29	31	45
H6	2	2.5	2.5	3	3	4	5	5	$7^{\pm0.5}$	$8^{\pm0.5}$
H7	20	30	30	30	35	40	40	50	40	50
H8	2	2.5	2.5	3	4	4	5	5	$5.5^{\pm0.2}$	$5.5^{\pm0.2}$
H9	0.5	1	1.5	2.5	2.5	3	4.5	4.5	2	2
L1	65/80	85	102	125	140	180	250	300	–	–
L2	46	58	70	85	100	125	200	245	–	–
L3	23	29	35	42.5	50	62.5	–	–	–	–
L4	25	33	41	50	58	75	–	–	–	–
L5	10.5	16	17	23	30	38	–	–	–	–
W	0.05	0.05	0.1	0.1	0.1	0.2	0.2	0.2	0.2	0.2

[1] Maximum dimension

1 Depth of fit

2 Reference dimension

3 For diameters other than ØD3 or (ØD3*) for port B, the distance from the cover support surface to the centre of the bore must be calculated.

4 Port B can be arranged around the central axis of port A. However, care must be taken to ensure that the mounting cavities and the pilot bores are not damaged.

5 Drilling for locating pin

6 Note on porting patter for size 16: Length L1 (x–y axis of bores) for control cover with built-on directional valve is 80 mm.

7 For Ø ≤ 45 mm → fit H8 permitted!

Technical data (for applications outside these parameters, please consult us!)

Ambient temperature range		°C	– 20 to + 70
Maximum operating pressure	– Without directional valve	bar	420
	– Ports A, B, X, Z1, Z2	bar	315; 350: 420 (according to the maximum operating pressure of built-on valves)
	– Port Y	bar	corresponds to maximum tank pressure of built-on valves
	– With monitored spool position	bar	400
Maximum flow		L/min	25000 (size-dependent; see characteristic curves on page 9)
Hydraulic fluid			Mineral oil (HL, HLP) to DIN 51524 [1]; fast bio-degradable hydraulic fluids to VDMA 24568 (see also RE 90221); HETG (rape seed oil) [1]; HEPG (polyglycols) [2]; HEES (synthetic esters) [2]; other hydraulic fluids on enquiry
Hydraulic fluid temperature range		°C	– 20 to + 80
Viscosity range		mm^2/s	2.8 to 500
Max. permissible degree of contamination of the hydraulic fluid - cleanliness class to ISO 4406 (c)			Class 20/18/15 [3]

[1] Suitable for NBR and FKM seals

[2] Suitable for FKM seals only

[3] The cleanliness classes specified for components must be adhered to in hydraulic systems. Effective filtration prevents malfunction and, at the same time, increases the service life of components.

For the selection of filters, see data sheets RE 50070, RE 50076, RE 50081, RE 50086 and RE 50088.

Ordering code: Cartridge valve (without control cover)

LC | | | | | | /

Size 16 (series 7X) = 16
Size 25 (series 7X) = 25
Size 32 (series 7X) = 32
Size 40 (series 7X) = 40
Size 50 (series 7X) = 50
Size 63 (series 7X) = 63
Size 80 (series 6X) = 80
Size 100 (series 6X) = 100
Size 125 (series 2X) = 125
Size 160 (series 2X) = 160

Area ratio 2:1 (annulus area = 50%) = A
Area ratio 14x3:1 (annulus area = 7%) = B

Cracking pressure approx. 0 bar (without spring) = 00
Cracking pressure approx. 0.5 bar = 05
Cracking pressure approx. 1.0 bar = 10
Cracking pressure approx. 2 bar = 20
Cracking pressure approx. 3 bar (size 125 only) = 30
Cracking pressure approx. 4 bar (not with sizes 125 and 160) = 40
For exact values, see page 8.

No code = NBR seals
V = FKM seals
(Other seals on enquiry)
⚠ **Caution!**
Observe compatibility of seals with hydraulic fluid used!

7X = (Sizes 16 to 63) component series 70 to 79
(70 to 79: unchanged installation and connection dimensions)
6X = (Sizes 80 and 100) component series 60 to 69
(60 to 69: unchanged installation and connection dimensions)
2X = (Sizes 125 and 160) component series 20 to 29
(20 to 29: unchanged installation and connection dimensions)

E = Valve poppet **without** damping nose
D = Valve poppet **with** damping nose

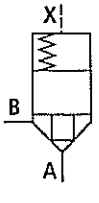
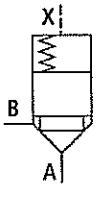
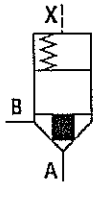
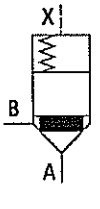
Preferred types

Type LC (cartridge vavle)	Material number
LC 16 A20D7X/	R900912572
LC 16 A20E7X/	R900910269
LC 16 A40D7X/	R900912573
LC 16 A40E7X/	R900912568
LC 16 B20E7X/	R900912595
LC 25 A20D7X/	R900912580
LC 25 A20E7X/	R900910270
LC 25 A40D7X/	R900912581
LC 25 A40E7X/	R900912574
LC 25 B20E7X/	R900912604
LC 25 B40D7X/	R900912609
LC 25 B40E7X/	R900912601
LC 32 A20D7X/	R900912589
LC 32 A20E7X/	R900906337
LC 32 A40D7X/	R900909665
LC 32 A40E7X/	R900909662
LC 32 B20E7X/	R900912613
LC 32 B40D7X/	R900912617
LC 32 B40E7X/	R900912610

Type LC (cartridge vavle)	Material number
LC 40 A20D7X/	R900937999
LC 40 A20E7X/	R900938000
LC 40 A40D7X/	R900935732
LC 40 A40E7X/	R900927973
LC 40 B20E7X/	R900938007
LC 50 A20D7X/	R900938026
LC 50 A20E7X/	R900920273
LC 50 A40D7X/	R900938027
LC 50 A40E7X/	R900929935
LC 50 B20E7X/	R900929665
LC 63 A20D7X/	R900938058
LC 63 A20E7X/	R900928826
LC 63 A40D7X/	R900938059
LC 63 A40E7X/	R900933230
LC 63 B20E7X/	R900938064

Further preferred types and standard components can be found in the EPS (standard price list).

Symbols: Cartridge valve (for versions, see ordering code)

Without damping nose				With damping nose			
	Area ratio A1 : A2 = 2 : 1 Version …A..E../…		Area ratio A1 : A2 = 14.3 : 1 Version …B..E../…		Area ratio A1 : A2 = 2 : 1 Version …A..D../…		Area ratio A1 : A2 = 14.3 : 1 Version …B..D../…

Technical data (for applications outside these parameters, please consult us!)

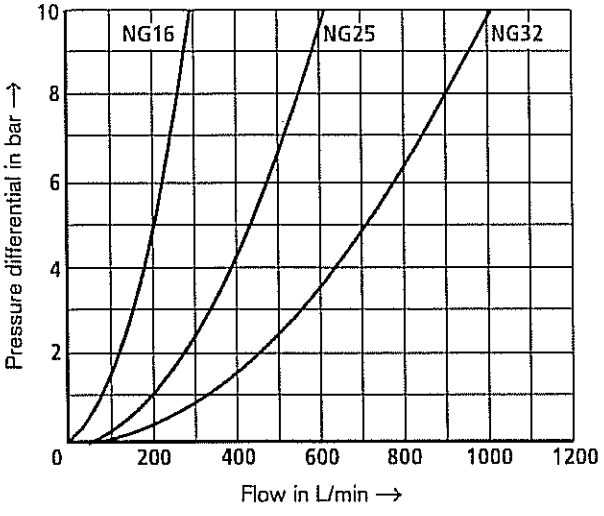
2-way cartridge valves for directional function

		Size									
		16	25	32	40	50	63	80	100	125	160
Area $A1$ in cm^2	LC..A..	1.89	4.26	6.79	11.1	19.63	30.2	37.9	63.6	95	160.6
	LC..B..	2.66	5.73	9.51	15.55	26.42	41.28	52.8	89.1	133.7	224.8
Area $A2$ in cm^2	LC..A..	0.95	1.89	3.39	5.52	8.64	14.0	18.84	31.4	48	79.9
	LC..B..	0.18	0.43	0.67	1.07	1.85	2.90	3.94	5.9	9.3	15.7
Area $A3$ in cm^2	LC..A..	2.84	6.16	10.18	16.62	28.27	44.2	56.74	95	143	240.5
	LC..B..	2.84	6.16	10.18	16.62	28.27	44.2	56.74	95	143	240.5
Stroke in cm	LC..E..	0.9	1.17	1.4	1.7	2.1	2.3	2.4	3.0	3.8	5.0
	LC..D..	0.9	1.17	1.4	1.9	2.3	2.8	3.0	3.8	4.8	6.5
Pilot oil volume in cm^3	LC..E..	2.56	7.21	14.3	28.3	59.4	102	136	285	544	1203
	LC..D..	2.56	7.21	14.3	31.6	65.0	124	170	361	687	1563
Theoretical pilot flow in l/min [1]	LC..E..	15.4	43.3	86	170	356	612	816	1710	3264	7218
	LC..D..	15.4	43.3	86	190	390	744	1020	2166	4122	9378
Weight in kg	Cartridge valve	0.25	0.5	1.1	1.9	3.9	7.2	13.0	27.0	44.0	75.0
	Control cover	1.2	2.3	4.0	7.4	10.5	21.0	27.0	42.0	80.0	150.0
Cracking pressure in bar											
Direction of flow from A to B	LC..A 00..	0.02	0.025	0.05	0.05	0.05	0.07	0.07	0.1	0.15	0.15
	LC..A 05..	0.35	0.35	0.36	0.35	0.37	0.31	0.44	0.43	0.43	0.45
	LC..A 10..	0.70	0.68	0.72	0.71	0.67	0.64	0.88	0.88	0.88	–
	LC..A 20..	2.03	2.18	2.12	2.02	2.01	2.0	1.75	1.75	1.76	1.94
	LC..A 30..	–	–	–	–	–	–	–	–	2.05	–
	LC..A 40..	3.50	3.90	3.80	4.0	4.11	3.8	3.13	3.04	–	–
	LC..B 00..	0.014	0.02	0.035	0.035	0.035	0.05	0.05	0.07	0.1	0.1
	LC..B 05..	0.25	0.26	0.26	0.25	0.28	0.23	0.31	0.31	0.31	0.32
	LC..B 10..	0.49	0.50	0.51	0.51	0.48	0.47	0.63	0.63	0.62	–
	LC..B 20..	1.44	1.62	1.52	1.44	1.5	1.5	1.26	1.25	1.25	1.4
	LC..B 30..	–	–	–	–	–	–	–	–	1.45	–
	LC..B 40..	2.48	2.90	2.70	2.86	3.05	2.8	2.25	2.17	–	–
Direction of flow from B to A	LC..A 00..	0.04	0.05	0.1	0.1	0.1	0.14	0.14	0.2	0.30	0.33
	LC..A 05..	0.69	0.78	0.72	0.7	0.84	0.68	0.88	0.88	0.86	0.91
	LC..A 10..	1.38	1.53	1.42	1.43	1.47	1.37	1.77	1.78	1.73	–
	LC..A 20..	4.05	4.91	4.25	4.06	4.57	4.33	3.53	3.54	3.50	3.9
	LC..A 30..	–	–	–	–	–	–	–	–	4.0	–
	LC..A 40..	6.96	8.74	7.6	8.05	9.34	8.15	6.3	6.2	–	–
	LC..B 00..	0.24	0.25	0.5	0.5	0.5	0.8	0.7	1.0	1.5	1.5
	LC..B 05..	3.69	3.40	3.64	3.64	3.95	3.27	4.2	4.6	4.4	4.6
	LC..B 10..	7.43	6.69	7.24	7.37	6.88	6.62	8.4	9.4	8.9	–
	LC..B 20..	21.3	21.5	21.6	20.9	21.4	20.9	16.9	18.7	17.9	20
	LC..B 30..	–	–	–	–	–	–	–	–	20.7	–
	LC..B 40..	36.6	38.3	38.6	41.5	43.6	39.4	30.2	32.5	–	–

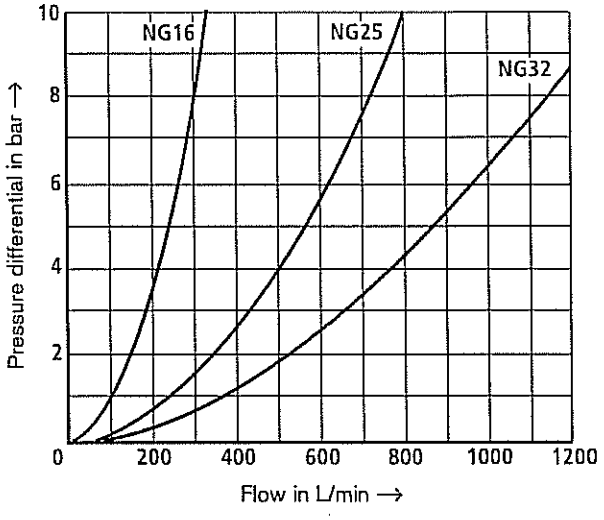
[1] with a switching time of 10 ms

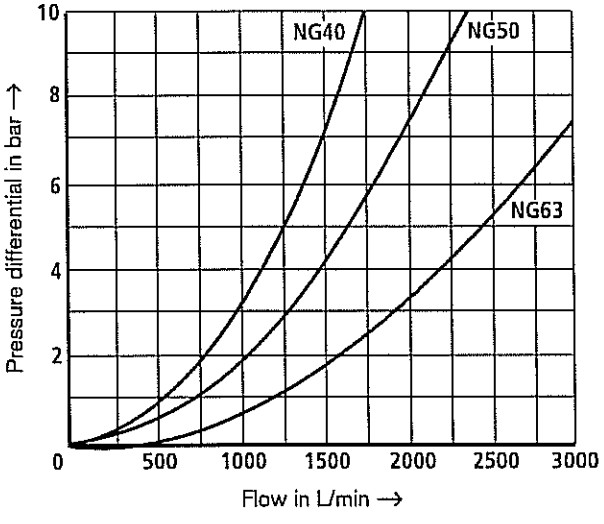
Characteristic curves (measured with HLP46, $\vartheta_{oil} = 40\ °C \pm 5\ °C$)

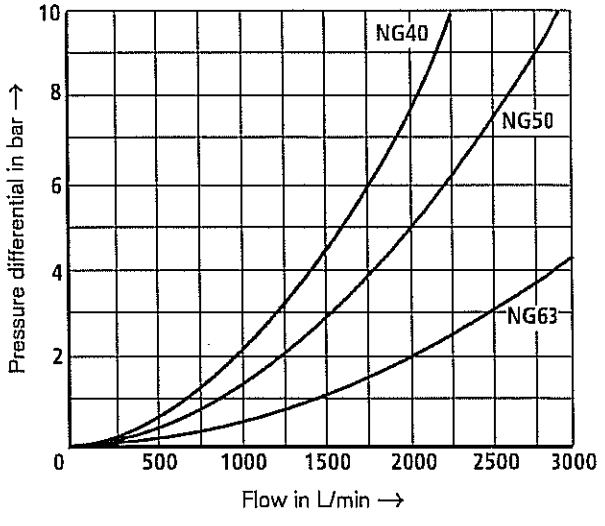
With damping nose

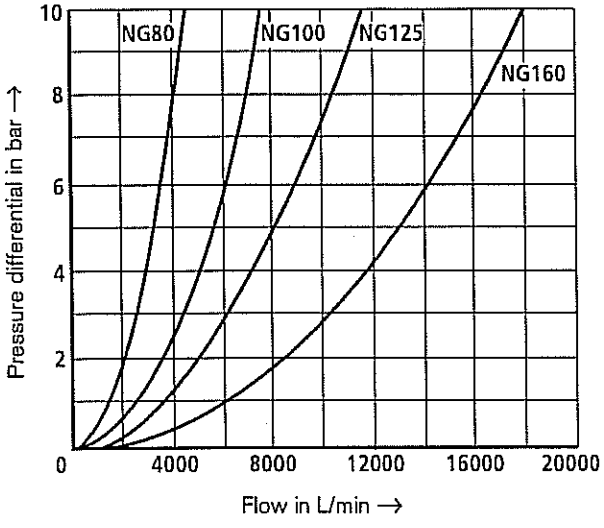


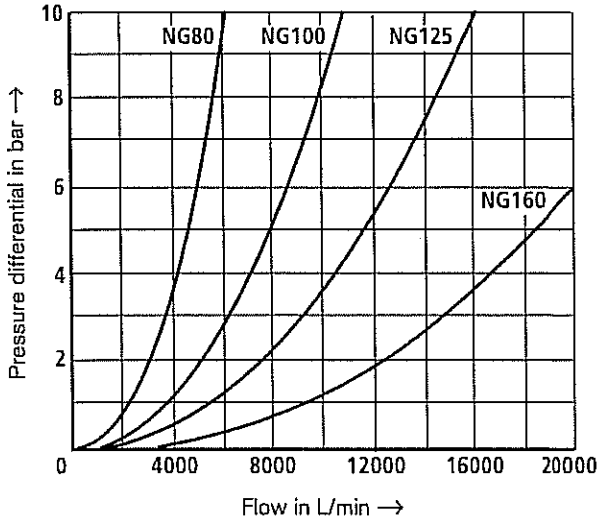
Without damping nose











General notes on the ordering code for control covers

x = available
• = on enquiry

1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17
LFA			– 1)	/ 2)	3)	4)										

Size										Type	Component series	Area ratio	Cracking pressure	Damping	El. monitor for closed position	Remote control port	Nozzles in channel 5)							Seal material
16	25	32	40	50	63	80	100	125	160								A	B	P	T	X	F	Z1	
x	x	x	x	x	x						7X													The ordering code can be found on the relevant pages of the individual control cover variants
						x	x				6X													
								x	x		2X													
x	x	x	x	x	x	x	x	x	x	D						F					x			
x	x	x	x							H1						F					x			
x	x	x	x	x	x	x	x	x	x	H2						F					x			
x	x	x	x							H3						F					x			
x	x	x	x	x	x	x	x			H4						F					x			
x	x	x	x	x	x	x	x			G											x		x	
	x	x	x	x	x	x	x			R												x		
	x	x	x	x	x					RF												x		
						x	x			R2												x		
x	x	x	x	x	x	x	x	•	•	WEA							x		x	x				
x	x	x	x	x	x	x	x	•	•	WEB								x	x	x				
x	x	x	x	x	x					WEMA									x	x		x		
						x	x			WEA8									x	x		x		
x	x	x	x	x	x					WEMB									x	x		x		
						x	x			WEB8									x	x		x		
x	x	x	x	x	x					WECA							x	x	x	x				
						x	x			WEA9							x	x	x	x				
x	x	x	x	x	x	x	x			GWA							x		x	x				
x	x	x	x	x	x	x	x			GWB								x	x	x				
x	x	x	x	x	x	x	x			KWA							x							
x	x	x	x	x	x	x	x			KWB								x						
x	x	x	x	x	x	•	•	•	•	E		x	x	D	QMG24	F					x			
x	x	x	x	x	x	•	•			EH2		x	x	D	QMG24	F					x			
x	x	x	x	x	x					EWA		x	x	D	QMG24		x		x	x				
x	x	x	x	x	x					EWB		x	x	D	QMG24			x	x	x				

1) **7X** = component series 70 to 79,
6X = component series 60 to 69 and
2X = component series 20 to 29: (unchanged installation and connection dimensions)

2) **CA** = 2 : 1 (area ratio *A1*:*A2*)
CB = 14.3 : 1 (area ratio *A1*:*A2*)
CD = 0 %
For the control cover with electrical monitor of the closed position (including position switch), the type designation includes the version of the control cover and the cartridge valve).

3) **10** = 1.0 bar cracking pressure
20 = 2.0 bar cracking pressure
40 = 4.0 bar cracking pressure

4) **D** = valve poppet of the cartridge with damping nose

5) Order of nozzles for the purchase order and representation in symbols and circuit diagrams.
Further details can be found on the relevant pages of the individual control cover variants and on page 14 (nozzle characteristic curves).

Preferred types, see page 11, are available at short notice!

General notes on the ordering code for control covers

Nozzle symbol		Symbol in the ordering code	
A**		A**	

This nozzle is designed as screw-in nozzle. If a nozzle is to be installed, the relevant code letter must be entered in the type designation together with the nozzle Ø in 1/10 mm.

Examle: **A12** = nozzle with Ø1.2 mm in channel A.

Nozzle symbol		Symbol in the ordering code
Ø1,2		

This nozzle is designed as a drilling; no entries are required in the type designation. (Nozzle Ø in mm)

Nozzle symbol		Symbol in the ordering code
Z12		

This nozzle is designed as threaded nozzle. It is a standard nozzle, for which no entries are required in the type designation. (Nozzle Ø in 1/10 mm)

For pilot control valves, see page 16!

Preferred types

Type LFA (control cover)	Material number
LFA 16 D-7X/F	R900912625
LFA 16 H2-7X/F	R900912655
LFA 16 WEA-7X/	R900910271
LFA 16 GWA-7X/	R900912636
LFA 16 E-7X/CA40DQMG24F	R900912619
LFA 25 D-7X/F	R900905302
LFA 25 H2-7X/F	R900912694
LFA 25 WEA-7X/	R900910273
LFA 25 GWA-7X/	R900912675
LFA 25 E-7X/CA40DQMG24F	R900912670
LFA 32 D-7X/F	R900905303
LFA 32 H2-7X/F	R900912728
LFA 32 WEA-7X/	R900912712
LFA 32 GWA-7X/	R900912708
LFA 32 E-7X/CA40DQMG24F	R900912703

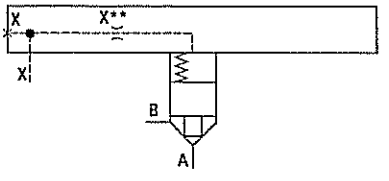
Type LFA (control cover)	Material number
LFA 40 D-7X/F	R900938073
LFA 40 H2-7X/F	R900938122
LFA 40 WEA-7X/	R900931581
LFA 40 GWA-7X/	R900938114
LFA 40 E-7X/CA40DQMG24F	R900938107
LFA 50 D-7X/F	R900938150
LFA 50 H2-7X/F	R900938205
LFA 50 WEA-7X/	R900938215
LFA 50 GWA-7X/	R900938200
LFA 50 E-7X/CA40DQMG24F	R900938197
LFA 63 D-7X/F	R900938225
LFA 63 H2-7X/F	R900938250
LFA 63 WEA-7X/	R900938257
LFA 63 GWA-7X/	R900938245
LFA 63 E-7X/CA40DQMG24F	R900938242

Further preferred types and standard components can be found in the EPS (standard price list).

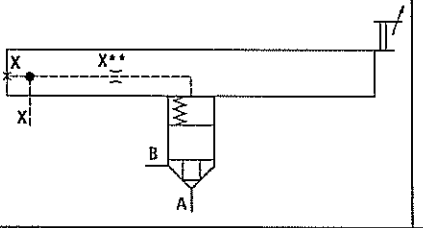
Symbols (basic symbols)

The symbols used in the description of types below are binding!

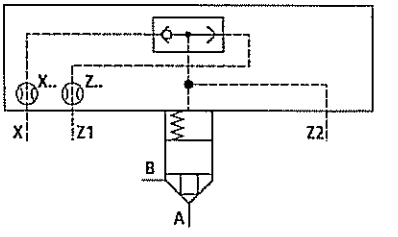
LFA . D-../F...
Control cover with remote control port
Sizes 16 to 160
Pages 17 and 18



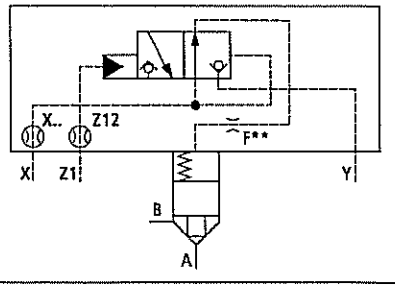
LFA . H.-../F...
Control cover with stroke limiter, with remote control port
Sizes 16 to 160
Pages 19 to 21



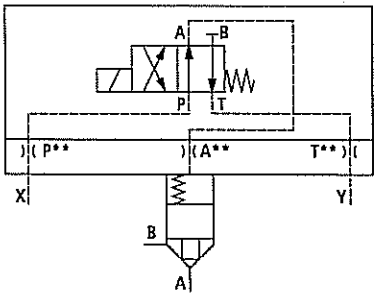
LFA . G-../...
Control cover with integrated shuttle valve
Sizes 16 to 100
Pages 22 and 23



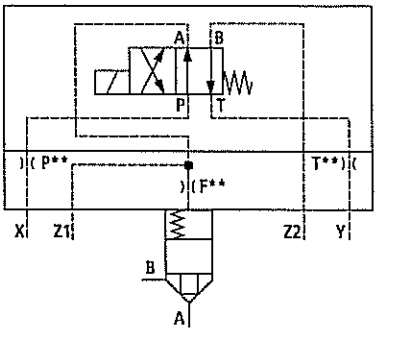
LFA . R-../...
Control cover with integrated pilot operated pilot control valve (directional poppet valve)
Sizes 25 to 100
Pages 24 to 27



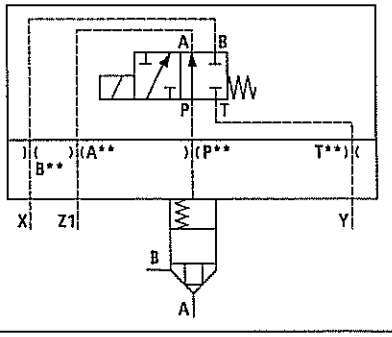
LFA . WEA-../...
Control cover for mounting a directional spool or poppet valve
Sizes 16 to 160
Pages 28 to 33



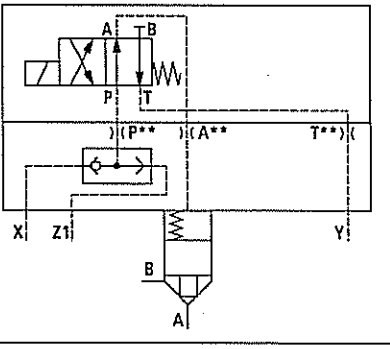
LFA . WEMA-../...; LFA . WEA8-../...
Control cover for mounting a directional spool or poppet valve with pilot ports for operating a 2nd valve
Sizes 16 to 100
Pages 34 to 39



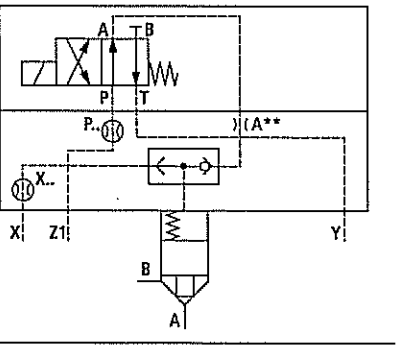
LFA . WECA-../...; LFA . WEA9-../...
Control cover for mounting a directional spool valve as check valve circuit
Sizes 16 to 100
Pages 40 to 43



LFA . GWA-../...
Control cover for mounting a directional spool or poppet valve, with integrated shuttle valve
Sizes 16 to 100
Pages 44 to 49



LFA . KWA-../...
Control cover for mounting a directional spool or poppet valve, with integrated shuttle valve as check valve circuit
Sizes 16 to 100
Pages 50 to 55

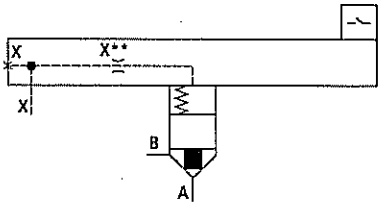


Symbols (basic symbols)

The symbols used in the description of types below are binding!

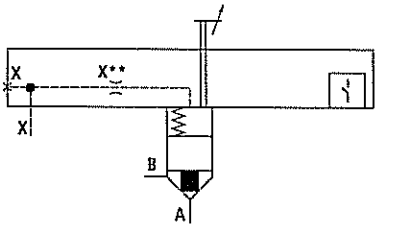
LFA . E-../..DQMG24F...
Control cover with electrical monitor for the closed position, including cartridge insert

Sizes 16 to 160
Pages 56 and 57



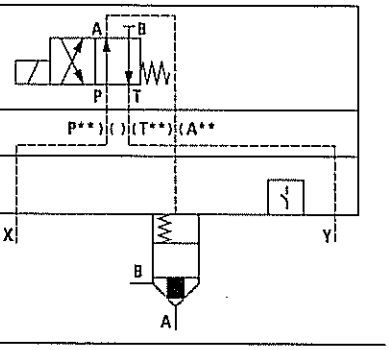
LFA . EH2-../..DQMG24F...
Control cover with electrical monitor for the closed position and stroke limiter, including cartridge insert

Sizes 16 to 100
Pages 58 and 59

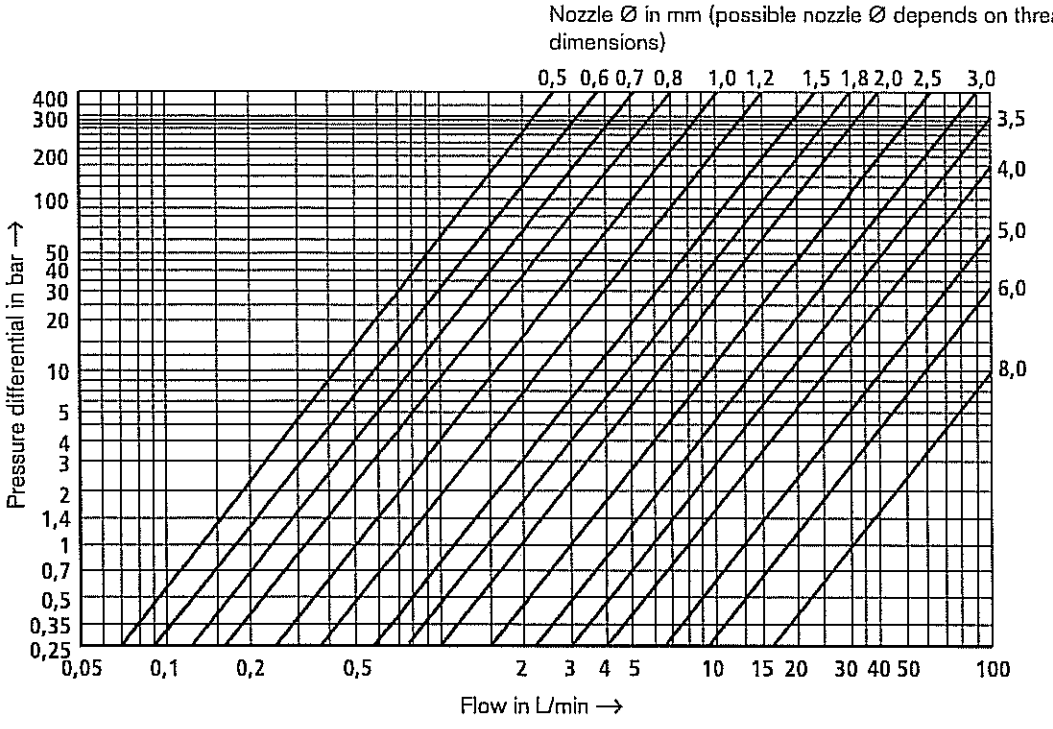


LFA . EWA-../..DQMG24...
Control cover with electrical monitor for the closed position, for mounting a directional spool or poppet valve, including cartridge insert

Sizes 16 to 63
Pages 60 to 65



Characteristic curves for the selection of nozzles



Thread	Nozzle Ø in mm
M6 tap.	0.5 to 3.0
M8 x 1 tap.	0.5 to 4.0
G3/8	0.8 to 6.0
G1/2	1.0 to 8.0

Material numbers of nozzles and plug screws

Standard nozzle for size	Nozzle Ø in mm	Material number			
		M6 tap.	M8 x 1 tap.	G3/8	G1/2
	0.5	R900157933	R900157930	–	–
	0.6	R900157934	R900149430	–	–
	0.7	R900157931	R900143957	–	–
16	0.8	R900152276	R900136843	R900159043	–
25	1.0	R900149335	R900136842	R900159033	R900139115
32	1.2	R900152286	R900139101	R900159032	R900150714
40	1.5	R900148823	R900133712	R900159031	R900139117
50	1.8	R900157932	R900150953	R900159030	R900159026
63 and 80	2.0	R900156650	R900137299	R900159029	R900148352
100	2.5	R900157929	R900137445	R900146259	R900148353
	3.0	R900181894	R900144761	R900149044	R900148361
	3.5	–	R900136079	R900146258	R900159027
	4.0	–	R900802480	R900149052	R900149939
	5.0	–	–	R900152287	R900143775
	6.0	–	–	R900135774	R900147875
	8.0	–	–	–	R900159028
Plug screw		R900023986	R900003443	R900006325	R900006445

General notes on the ordering code for control covers (pilot control valves)

Pilot control valve	Type	Size	Data sheet no.	Control cover type	Size (control cover)
Directional spool valve (wet pin)	4WE 6 D...6X/E	6	23178	WEA, WEB, GWA, GWB, KWA, KWB, EWA, EWB, WEMA, WEMB	16 to 50
	3WE 6 A...6X/E	6	23178	WECA	16 to 50
	4WE 10 D...3X/E	10	23327	WEA, WEB, GWA, KWA, KWB, EWA, EWB	63 to 100
	4WE 10 A...3X/E	10	23327	WEA 9, WECA	63 to 100
Diretional poppet valve	M-3SED 6 UK../350 M-3SED 6 CK../350	6	22049	WEMA, WEA, GWA, KWA	16 to 50
	M-3SEW 6 U../420 M-3SEW 6 C../420	6	22058	WEA, GWA, KWA, EWA, WEMA	16 to 50
	M-3SED 10 UK../350 M-3SED 10 CK../350	10	22045	WEA, GWA, KWA	63 to 100
	M-3SEW 10 U../420 M-3SEW 10 C../420	10	22075	WEA, GWA, KWA, EWA	63 to 100

Pilot control valves must be ordered separately.
For more details, see data sheet.

Valve fixing screws are included in the scope of supply of the control cover.

☞ **Note!**

By combining a 2-way cartridge valve with a pilot control valve, various valve functions can be realised. In particular, the following components with porting patter to ISO 4401-03-02-0-94 (up to size 50) and ISO 4401-05-04-0-94 (sizes 63 to 100) are suitable for this purpose.

Fixing screws [1] (included in the scope of supply)

Size	Control cover type	Qty	Dimensions	Tightening torque M_T in Nm [3]
16	WE., GW.	4	M8 x 45	32
	WEM.		M8 x 70	
	E		M8 x 60	
	EH2		M8 x 80	
	EW.		M8 x 85	
	[2]		M8 x 40	
25	E	4	M12 x 60	110
	EH2, EW.		M12 x 90	
	[2]		M12 x 50	
32	H1, H2, E	4	M16 x 80	270
	H3, H4		M16 x 70	
	EH2, EW.		M16 x 110	
	[2]		M16 x 60	
40	E, EW.	4	M20 x 120	520
	EH2		M20 x 200	
	H1, H2		M20 x 110	
	[2]		M20 x 70	
50	H2, H4	4	M20 x 120	520
	E, EW.		M20 x 130	
	EH2		M20 x 210	
	[2]		M20 x 80	
63	H2, H4	4	M30 x 150	1800
	E, EW.		M30 x 180	
	EH2		M30 x 250	
	[2]		M30 x 100	
80	H2, H4	8	M24 x 120	900
	[2]		M24 x 100	
100	D, WE.	8	M30 x 120	1800
	[2]		M30 x 140	
125	All control covers available	8	M36 x 160	3100
160	All control covers available	12	M42 x 220	5000

[1] **Hexagon socket head cap screws to ISO 4762 - 10.9**

[2] Other available standard control covers

[3] Calculated with a total coefficienct of friction $\mu = 0.14$; must be adjusted for other surfaces

Control cover for mounting a directional spool valve: Type ..GWA..., ..GWB...

Sizes 16 to 50

1	2	3	4	10	11	12	13	17
LFA		−7X/						

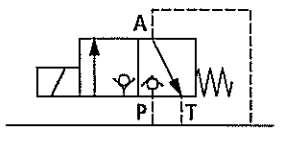
Size					Type	Nozzle in channel (Ø in 1/10 mm)			
16	25	32	40	50		A	B	P	T
x	x	x	x	x	GWA	A**		P**	T**
x	x	x	x	x	GWB		B**	P**	T**

No code = NBR seals
V = FKM seals
(Other seals on enquiry)
⚠ **Caution!**
Observe compatibility of seals with hydraulic fluid used!

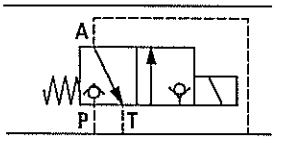
◿ Nozzle possible; indicate, if required

For ordering codes for nozzles, see page 14 and 15.

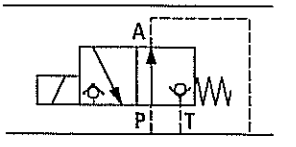
M-3SEW 6 C../420...



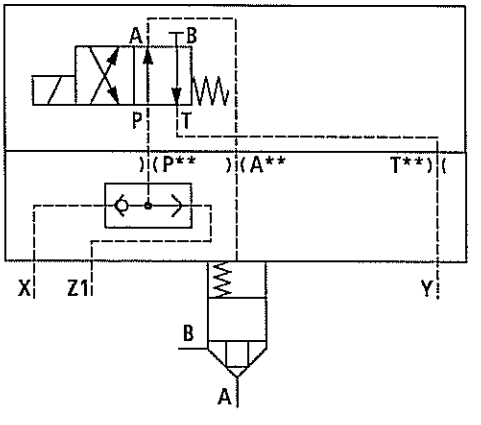
M-3SED 6 CK../350...



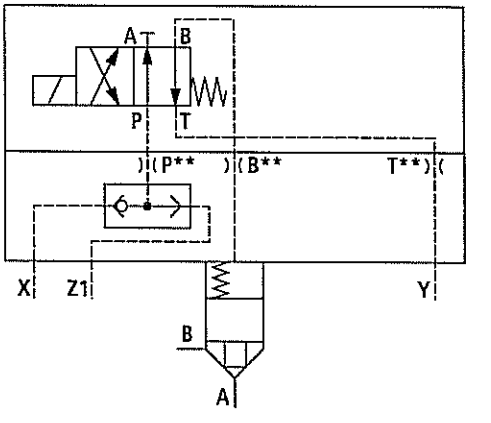
M-3SED 6 UK../350...
M-3SEW 6 U../420...



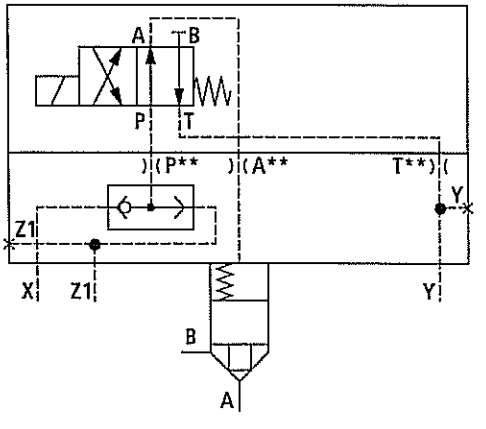
LFA . GWA...
sizes 16 to 32
(with directional spool valve type 4WE 6 D...)



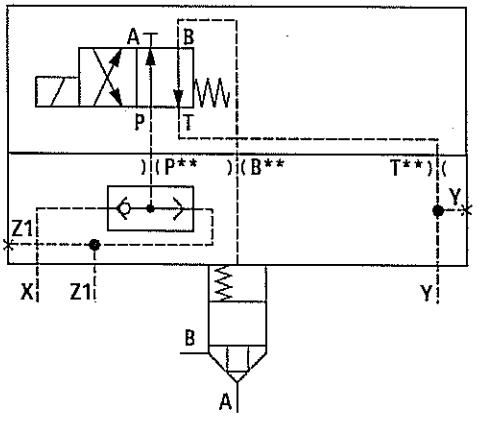
LFA . GWB...
sizes 16 to 32
(with directional spool valve type 4WE 6 D...)



LFA . GWA...
sizes 40 and 50
(with directional spool valve type 4WE 6 D...)

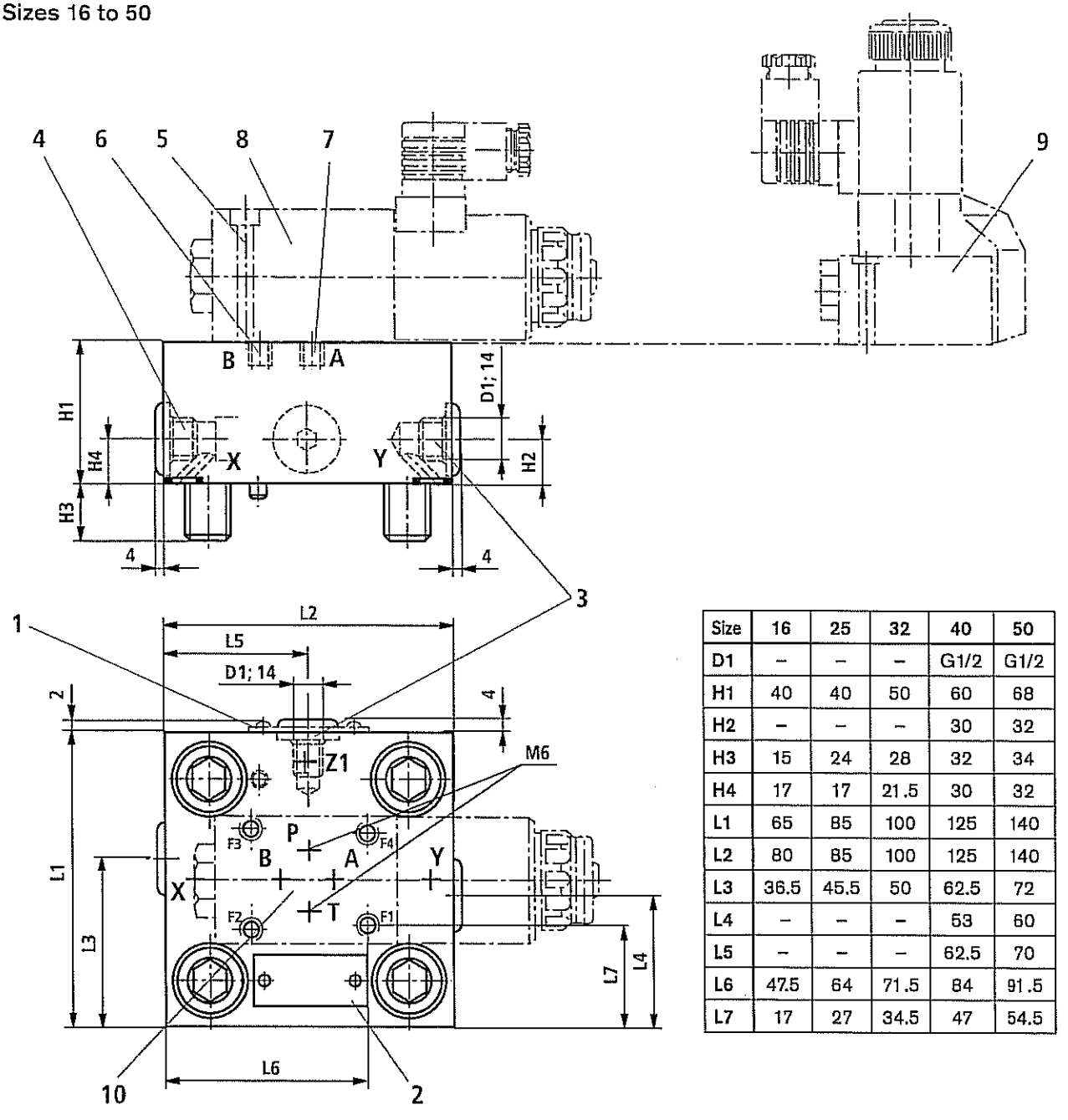


LFA . GWB...
sizes 40 and 50
(with directional spool valve type 4WE 6 D...)



Control cover for mounting a directional spool valve: Type ..GWA..., ..GWB... (nominal dimensions in mm)

Sizes 16 to 50



Size	16	25	32	40	50
D1	–	–	–	G1/2	G1/2
H1	40	40	50	60	68
H2	–	–	–	30	32
H3	15	24	28	32	34
H4	17	17	21.5	30	32
L1	65	85	100	125	140
L2	80	85	100	125	140
L3	36.5	45.5	50	62.5	72
L4	–	–	–	53	60
L5	–	–	–	62.5	70
L6	47.5	64	71.5	84	91.5
L7	17	27	34.5	47	54.5

1 Nameplate for sizes 16, 25, 32

2 Nameplate for sizes 40 and 50

3 Ports Y and Z1 optionally as threaded connection for sizes 40 and 50

4 Shuttle valve

5 Valve fixing screws are included in the control cover's scope of supply

6 Plug screw M6 for ..GWA...

7 Plug screw M6 for ..GWB...

8 Directional spool valve type 4WE 6 D...

9 Directional poppet valve type M-3SEW 6 ...

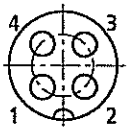
10 Position of ports to ISO 4401-03-02-0-94

Inductive position switch type QM, electrical connection

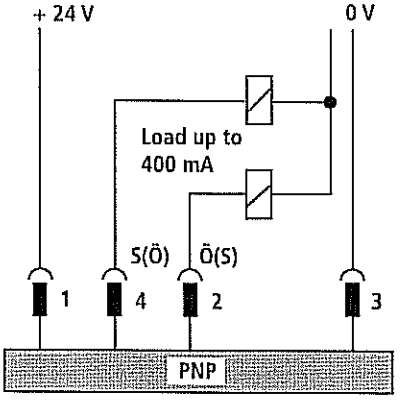
The electrical connection is made by means of a 4-pin cable socket with threaded connection M12 x 1.

The cable socket must be ordered separately (see below).

Operating voltage	24 V DC voltage	+ 20 % – 10 %
	(Residual ripple content < 10%)	
Current consumption:	Maximum 40 mA	
Load-carrying capacity of outputs :	400 mA (output to PNP 24 V =)	
Temperature range:	–20° C to +80° C	
Pin assignment:	1: +24V	
	2: Normally-closed (low-resistance–high-resistance)	
	3: 0 V	
	4: Normally-open (high-resistance–low-resistance)	



Plug-in contacts on position switch



Inductive position switch type QM can be a normally-closed or normally-open contact.

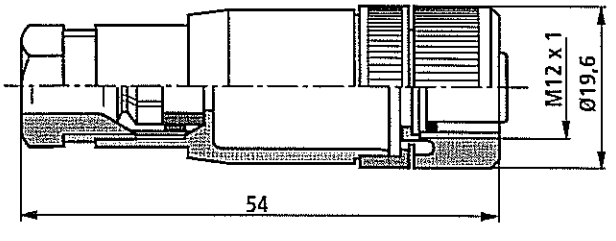
⚠ **Caution!**

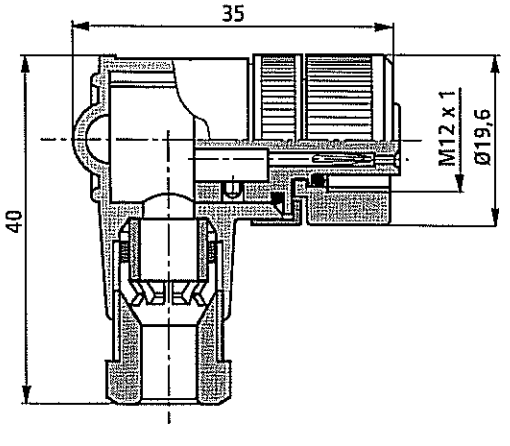
The position switch is not provided with a protective conductor connection!

Cable socket for inductive position switch type QM, separate order (nominal dimensions in mm)

Cable socket Z24, 4-pin, M12 x 1
with threaded connection, cable gland Pg 9.

Material no. **R900031155**



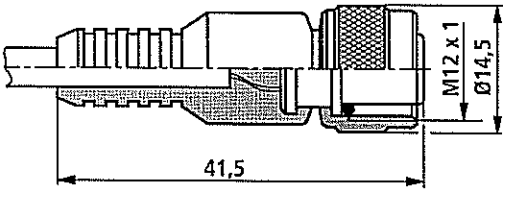


Cable socket Z24-3m, 4-pin, M12 x 1
with moulded-on PVC cable, 3m long.

Cable cross-section: 4 x 0.34 mm²

Wire identification:
1: brown
2: white
3: blue
4: black

Material no. **R900064381**



Cable socket Z24 – angled, 4-pin, M12 x 1
with threaded connection, cable gland Pg 9, angled.

Housing can be rotated through 4 x 90° in relation to the contact insert.

Material no. **R900082899**

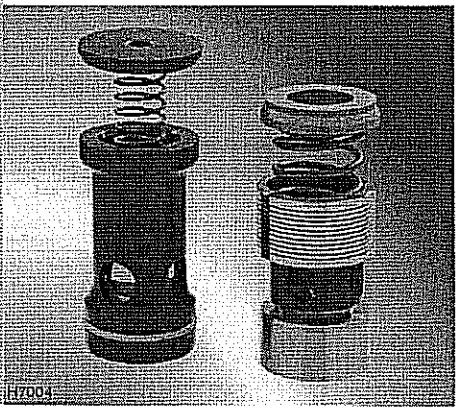
Rexroth
Bosch Group

Check valve, cartridge type

RE 20380/11.06 1/8
Replaces: 12.02

Type M-SR

Sizes 6 to 30
Component series 1X
Maximum operating pressure 315 bar
Maximum flow 400 l/min



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Technical data	3
Characteristic curves – angle valve	4
Characteristic curves – straight valve	5
Mounting cavity – angle valve	6, 7
Mounting cavity – straight valve	8

Features

- For installation in manifold blocks
  - as angle valve
  - as straight valve
- Leak-free closure in one direction
- Various cracking pressures, optional (see ordering code)

Information on available spare parts:
www.boschrexroth.com/spc

Ordering code

M-SR | | | –1X/ | *

Check valve, cartridge design = M-SR

Size 6 (not as angle valve) = 6
Size 8 = 8
Size 10 = 10
Size 15 = 15
Size 20 = 20
Size 25 = 25
Size 30 = 30

Component design
Angle valve = KE
Straight valve = KD

Cracking pressure (see characteristic curves on pages 4 and 5)
00 = Without spring (not for straight valve)
02 =
05 = (Standard)
15 =
30 =
50 =

1X = Component series 10 to 19
(10 to 19: unchanged installation and connection dimensions)

Seal material
No code = NBR seals
V = FKM seals (with angle valve only)
⚠ **Important!**
Observe compatibility of seals with hydraulic fluid used!

Further details in clear text

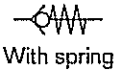
Standard types

Type	Material number
M-SR 6 KD05-1X/	R900301889
M-SR 8 KE02-1X/	R900357438
M-SR 8 KE05-1X/	R900346083
M-SR 10 KE05-1X/	R900344549
M-SR 15 KE02-1X/	R900348943
M-SR 15 KE05-1X/	R900345372

Type	Material number
M-SR 20 KE02-1X/	R900345744
M-SR 20 KE05-1X/	R900340979
M-SR 25 KE05-1X/	R900344778
M-SR 30 KE05-1X/	R900344919

Further standard types and components can be found in the EPS (standard price list).

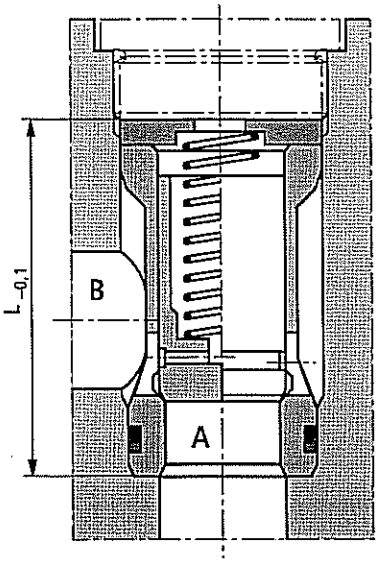
Symbols


With spring

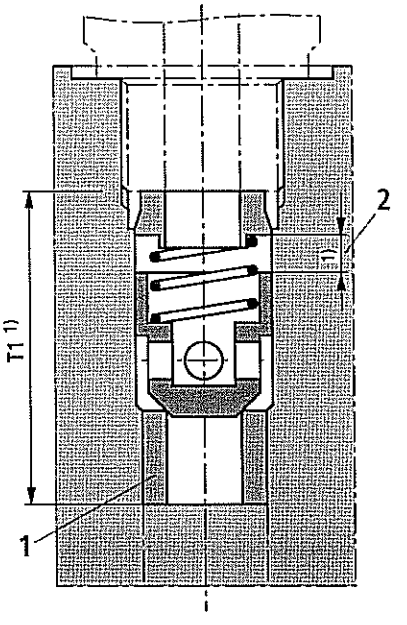
Without spring

Sections

Angle valve



Straight valve



Size	$L_{-0.1}$
8	36.3
10	39.3
15	45.8
20	55.3
25	74.3
30	83.3

1 Seat, shrink-fit at –60 °C

2 Poppet stroke

1) For dimensions, see installation drawing

Technical data (for applications outside these parameters, please consult us!)

General

Sizes		Size	6	8	10	15	20	25	30
Weight	– Angle valve	kg	–	0.03	0.05	0.08	0.14	0.32	0.47
	– Straight valve	kg	0.05	0.05	0.05	0.1	0.2	0.25	0.3
Installation orientation			Optional						
Ambeint temperature range		°C	–20 to +80 (NBR seals) –20 to +80 (FKM seals)						

Hydraulic

Maximum operating pressure	bar	315
Cracking pressure	bar	See characteristic curves on pages 4 and 5
Maximum flow	l/min	See characteristic curves on pages 4 and 5
Hydraulic fluid		Mineral oil (HL, HLP) to DIN 51524 [1]; fast bio-degradable hydraulic fluids to VDMA 24568 (see also RE 90221); HETG (rape seed oil) [1]; HEPG (polyglycols) [2]; HEES (synthetic esters) [2]; other hydraulic fluids on enquiry
Hydraulic fluid temperature range	°C	–30 to +80 (for NBR seals) –20 to +80 (for FKM seals)
Viscosity range	mm^2/s	2.8 to 500
Max. permissible degree of contamination of the hydraulic fluid - cleanliness class to ISO 4406 (c)		Class 20/18/15 [3]

[1] Suitable for NBR and FKM seals

[2] Suitable only for FKM seals

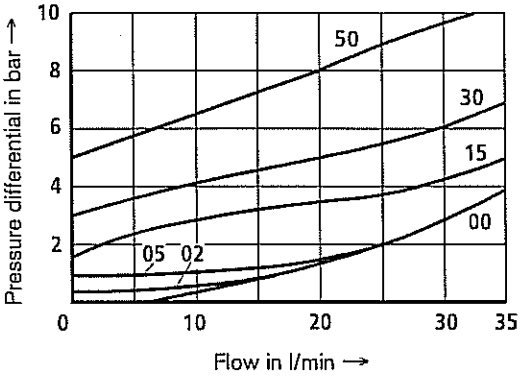
[3] The cleanliness classes specified for components must be adhered to in hydraulic systems. Effective filtration prevents malfunction and, at the same time, prolongs the service life of components.

For the selection of filters, see data sheets RE 50070, RE 50076, RE 50081, RE 50086 and RE 50088.

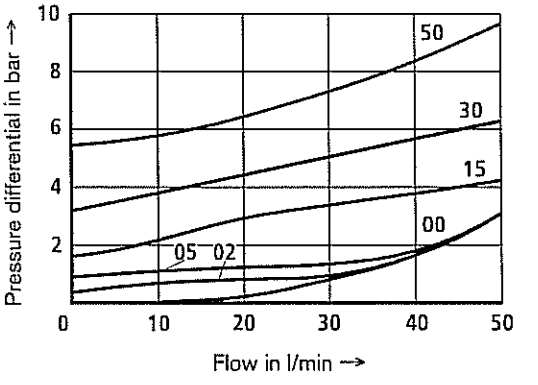
Characteristic curves (measured with HLP46, $\vartheta_{oil} = 40\ °C \pm 5\ °C$) – angle valve

Pressure differential Δp in dependence upon flow q_V at cracking pressure

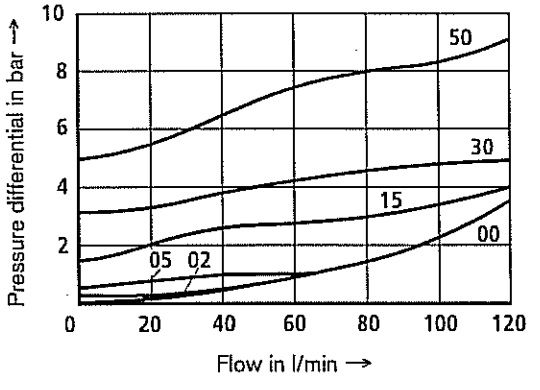
Size 8



Size 10



Size 15



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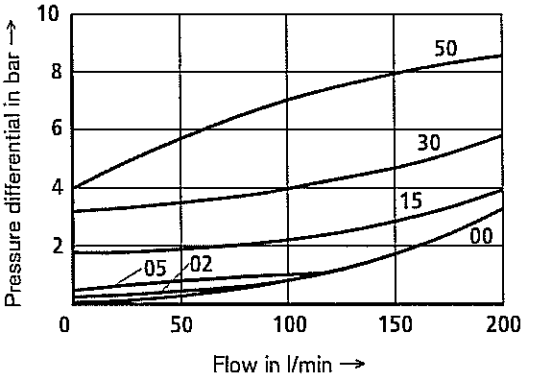
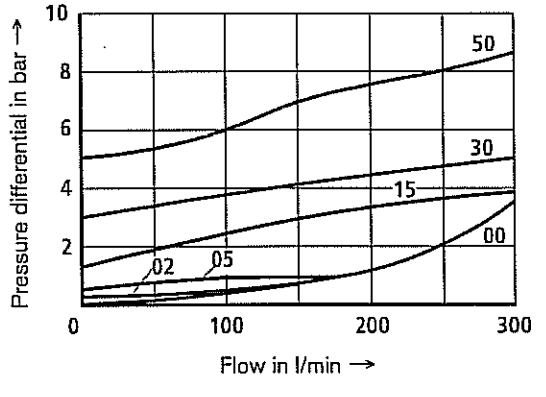
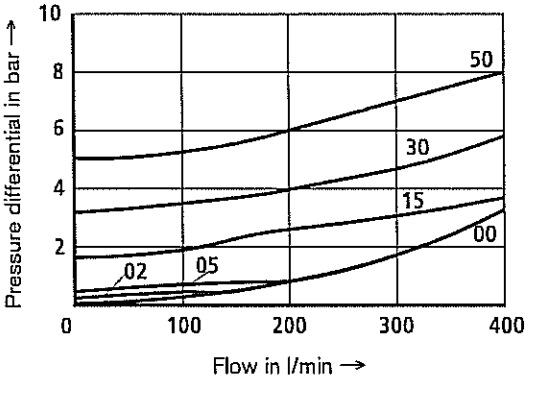


Size 25



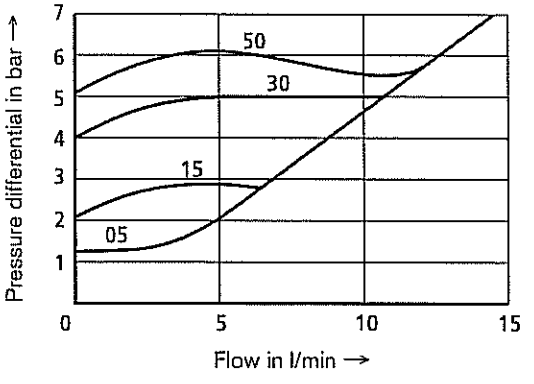
Size 30



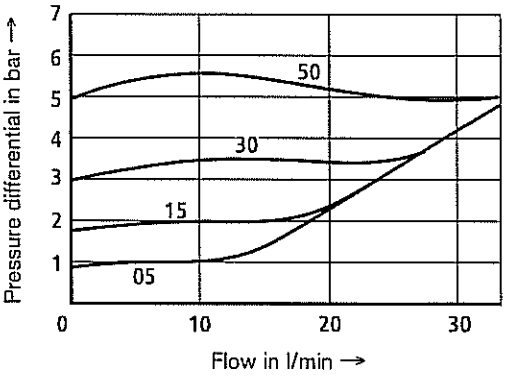
Characteristic curves (measured with HLP46, $\vartheta_{oil} = 40\ °C \pm 5\ °C$) – straight valve

Pressure differential Δp in dependence upon flow q_V at cracking pressure

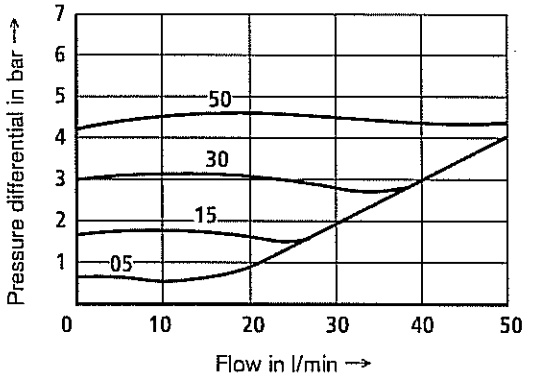
Size 6



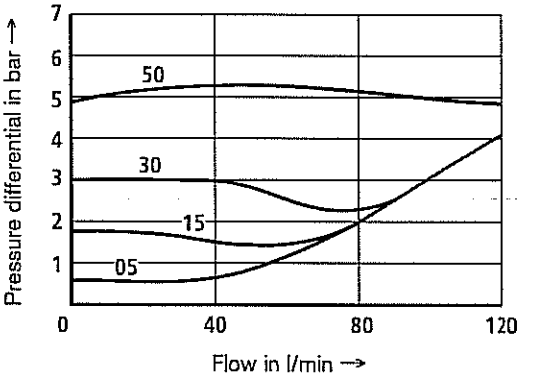
Size 8



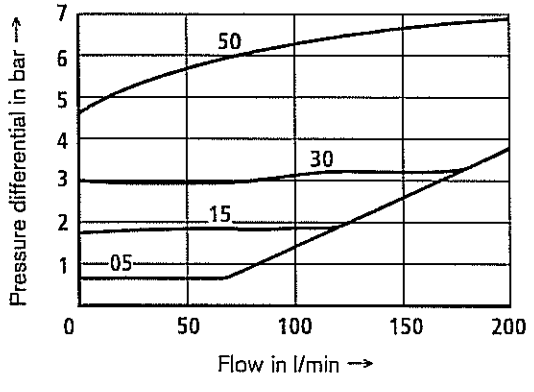
Size 10



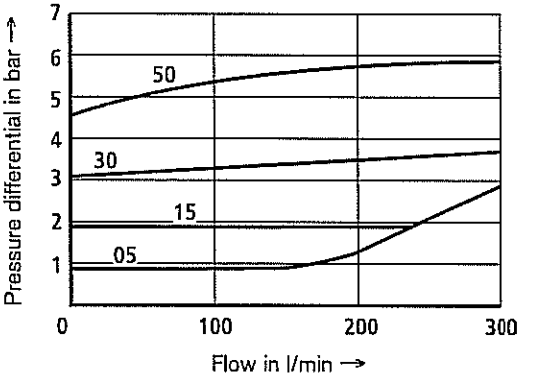
Size 15



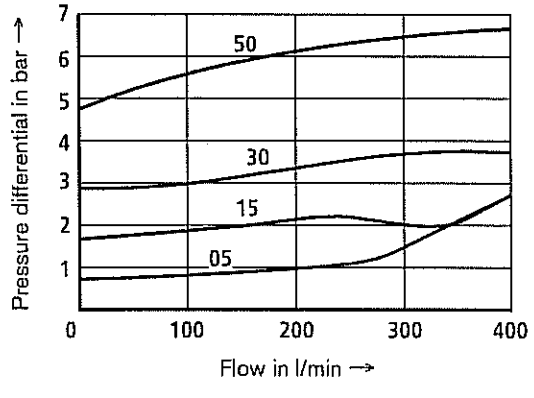
Size 20



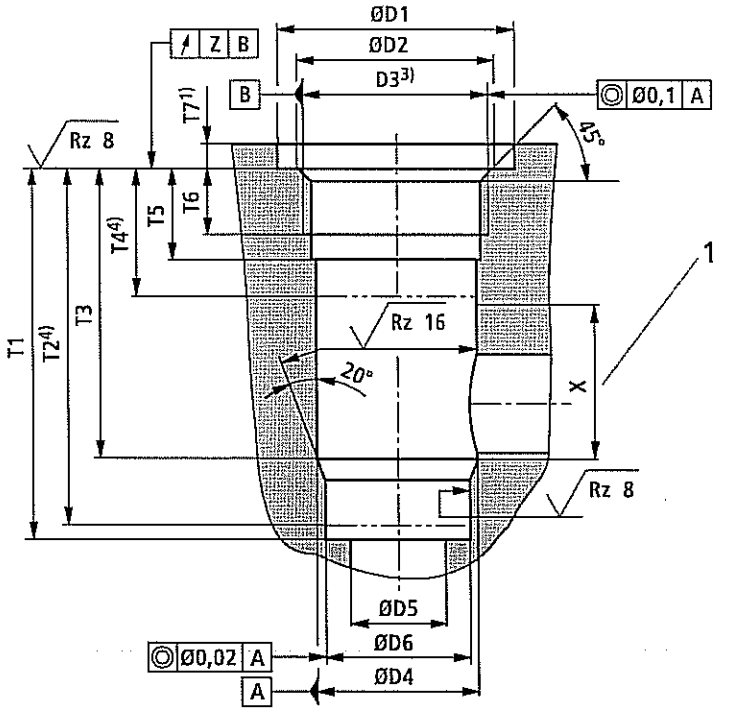
Size 25



Size 30



Mounting cavity: Angle valve for plug screw to RN 143.21 (nominal dimensions in mm)



1 Area for drain bore

Size	Plug screws 2) Material no.	p_N in bar	ØD1	ØD2	D3	ØD4 H8	ØD5	ØD6 H7
8	R900002423	315	23	17.1	G3/8 3)	14	8	13
10	R900002422	315	28	21.4	G1/2 3)	18	10	17
15	R900012091	315	33	26.8	G3/4 3)	24	15	22
20	R900002424	315	41	33.8	G1 3)	30	20	28
25	R900012411	250	51	42.5	G1 1/4 3)	38	25	36
30	R900012412	250	56	48.5	G1 1/2 3)	44	30	42

Size	T1 +0.1	T2	T3	T4	T5	T6	T7 +0.5	T8 +0.2	X	Z
8	48.5	47.5	38.5	20	15	12	6	–	18	0.05
10	53.5	52.5	43.5	24	18	14	6	–	19	0.05
15	62	60.5	50	26	20.5	16	6	–	24	0.05
20	71.5	70	56.5	26	20.5	16	7	–	30	0.05
25	90.5	88	72.5	28	22	16	7	–	43	0.1
30	99.5	96.5	79.5	31	22	16	7	–	48	0.1

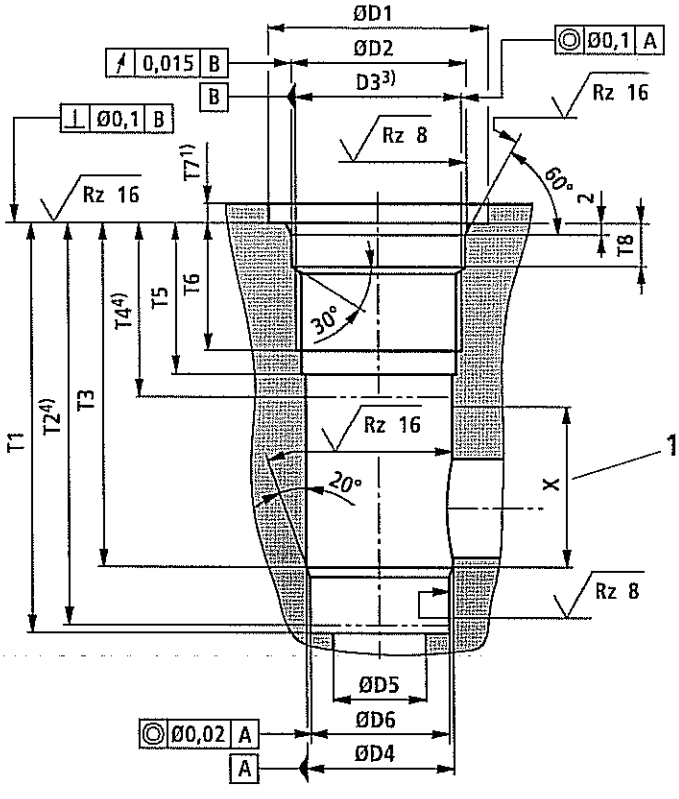
1) Dimension for countersinking the screw head. When installing the cartridge more deeply, extend dimension T7 accordingly.

2) With NBR seal

3) Pipe thread "G..." to ISO 228/1

4) Depth of fit

Mounting cavity: Angle valve for plug screw to RN 143.28 (nominal dimensions in mm)



1 Area for drain bore

Size	Plug scews 2) Material no.	p_N in bar	ØD1	ØD2	D3	ØD4 H8	ØD5	ØD6 H7
25	R900323609	315	$56^{+0.5}$	44^{H8}	M42 x 1.5 3)	38	25	36
30	R900323610	315	$62^{+0.5}$	50^{H8}	M48 x 1.5 3)	44	30	42

Size	T1 +0.1	T2	T3	T4	T5	T6	T7 +0.5	T8 +0.2	X	Z
25	106.5	104	88.5	45	39	33	5	12	43	–
30	115.5	112.5	95.5	48	39	33	5	12	48	–

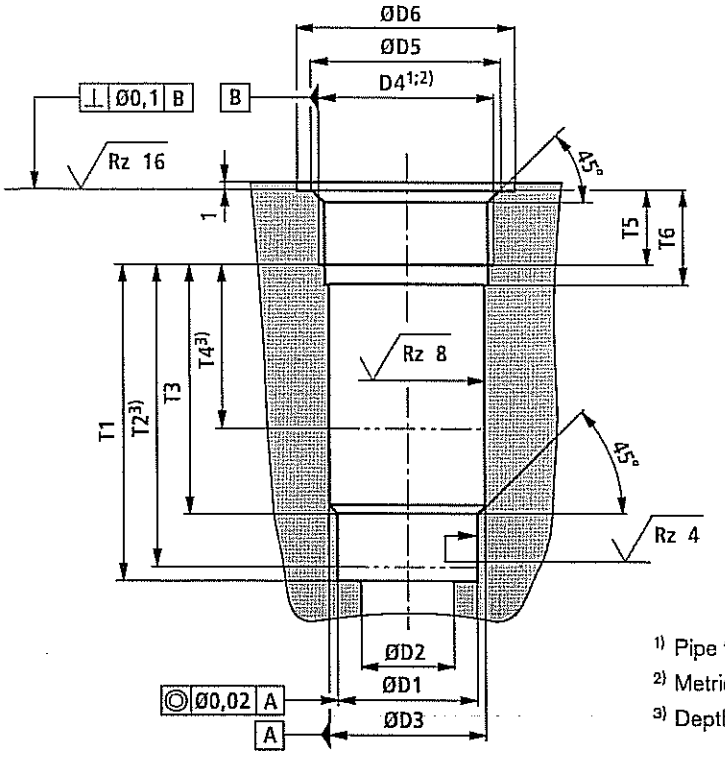
1) Dimension for countersinking the screw head. When installing the cartridge more deeply, extend dimension T7 accordingly.

2) With NBR seal

3) Metric ISO fine thread to DIN 13

4) Depth of fit

Mounting cavity: Straight valve (nominal dimensions in mm)



1) Pipe thread "G..." to ISO 228/1
2) Metric ISO fine thread to DIN 13
3) Depth of fit

Size	ØD1 H7	ØD2	ØD3 H8	D4 1)	ØD5 ±0.1 1)	D4 2)	ØD5 ±0.1 2)	ØD6
6	10	6	11	G1/4	13.6	M14 x 1.5	14.4	25
8	13	8	14	G3/8	17.1	M18 x 1.5	18.4	28
10	17	10	18	G1/2	21.4	M22 x 1.5	22.4	34
15	22	15	24	G3/4	26.8	M27 x 2	27.4	42
20	28	20	30	G1	33.8	M33 x 2	33.5	47
25	36	25	38	G1 1/4	42.5	M42 x 2	42.5	58
30	42	30	44	G1 1/2	48.5	M48 x 2	48.5	65

Size	T1 $_{-0,1}$	T2	T3	T4	T5	T6	Z	Poppet stroke
6	29.8	27.8	21.8	19	12	16	0.05	4
8	32.8	30.8	22.8	18	12	16	0.05	4
10	38.8	36.8	28.8	21	14	19	0.05	4
15	48.4	46.4	36.4	27	16	21	0.05	5
20	59	57	44	29	18	24	0.05	5
25	73	71	55	39	20	26	0.1	7
30	83	81	63	42	22	28	0.1	7

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www.boschrexroth.de

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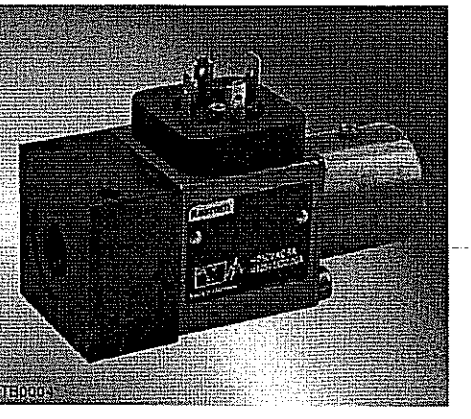
Rexroth
Bosch Group

Hydro-elektrischer Druckschalter

RD 50061/02.06 1/16
Ersetzt: 50060

Typ HED 8



Geräteserie 2X
Maximaler Betriebsdruck 630 bar

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Informationen zu lieferbaren Ersatzteilen:
www.boschrexroth.com/spc

Merkmale

- für Plattenaufbau
- für Rohrleitungseinbau
- für Flanschanschluss, Lage der Anschlüsse nach ISO 16873
- als Höhenverkettungselement, Lage der Anschlüsse nach DIN 24340 Form A
- in Längsverkettungen
- 5 Druckstufen, wahlweise
- 4 Verstellelemente, wahlweise:
  - Spindel mit Innensechskant, mit oder ohne Schutzkappe (Schutzkappe verplombbar)
  - Spindel mit Innensechskant und Skala, mit oder ohne Schutzkappe
  - Drehknopf mit Skala
  - abschließbarer Drehknopf mit Skala
- Leitungsdose mit Beschaltung (Leuchtanzeige) (separate Bestellung)

Bestellangaben

HED 8	–2X/	K14			*

Kolben-Druckschalter

Flanschanschluss (ISO 16873)[1] = OH
Plattenaufbau = OP
Rohrleitungseinbau = OA

Geräteserie 20 bis 29 = 2X
(20 bis 29: unveränderte Einbau- und Anschlussmaße)

Maximaler Einstelldruck 50 bar = 50
Maximaler Einstelldruck 100 bar = 100
Maximaler Einstelldruck 200 bar = 200
Maximaler Einstelldruck 350 bar = 350
Maximaler Einstelldruck 630 bar [2] = 630

elektrischer Anschluss
ohne Leitungsdose = K14 [3]
Einzelanschluss mit Gerätestecker nach DIN EN 175301-803

weitere Angaben im Klartext

Dichtungswerkstoff
ohne Bez. = NBR-Dichtungen
V = FKM-Dichtungen
(andere Dichtungen auf Anfrage)
⚠ **Achtung!**
Dichtungstauglichkeit der verwendeten Druckflüssigkeit beachten!

ohne Bez. = Spindel ohne Skala, ohne Schutzkappe
S = Spindel ohne Skala, mit Schutzkappe
A [5] = Spindel mit Skala, ohne Schutzkappe
AS [5] = Spindel mit Skala, mit Schutzkappe
KS [4; 5] = abschließbarer Drehknopf mit Skala
KW [5] = Drehknopf mit Skala

[1] Zwischenplatte für Höhenverkettung, separate Bestellung, siehe Seiten 11 bis 14

[2] nicht für Höhenverkettung zulässig

[3] Leitungsdosen, separate Bestellung, siehe Seite 4

[4] H-Schlüssel, Material-Nr. **R900008158**, ist im Lieferumfang enthalten

[5] die exakte Einstellung des Schaltdruckes ist nur mit einem Manometer möglich (Skala dient nur zur Orientierung)

Vorzugstypen

Typ	Material-Nr.
HED 8 OP-2X/100K14	R901102747
HED 8 OP-2X/200K14	R901102721
HED 8 OP-2X/350K14S	R901102365
HED 8 OA-2X/050K14	R901101698
HED 8 OA-2X/50K14S	R901102704
HED 8 OA-2X/50K14KS	R901102702
HED 8 OA-2X/50K14KW	R901102754
HED 8 OA-2X/100K14	R901102706
HED 8 OA-2X/100K14S	R901102711
HED 8 OA-2X/100K14KW	R901094159
HED 8 OA-2X/200K14	R901102708
HED 8 OA-2X/200K14S	R901102727
HED 8 OA-2X/350K14	R901102710
HED 8 OA-2X/350K14S	R901102778
HED 8 OA-2X/350K14AS	R901102722
HED 8 OA-2X/350K14KW	R901102716

Typ	Material-Nr.
HED 8 OH-2X/50K14	R901102349
HED 8 OH-2X/50K14V	R901099796
HED 8 OH-2X/50K14S	R901102712
HED 8 OH-2X/50K14AV	R901099798
HED 8 OH-2X/50K14KS	R901102356
HED 8 OH-2X/50K14KSV	R901099800
HED 8 OH-2X/100K14	R901102360
HED 8 OH-2X/100K14V	R901099775
HED 8 OH-2X/100K14S	R901095375
HED 8 OH-2X/100K14AV	R901099780
HED 8 OH-2X/100K14KSV	R901099788
HED 8 OH-2X/200K14	R901099808
HED 8 OH-2X/200K14V	R901099789
HED 8 OH-2X/200K14S	R901102362
HED 8 OH-2X/200K14AV	R901099790
HED 8 OH-2X/350K14V	R901099815
HED 8 OH-2X/350K14S	R901102713

Weitere Vorzugstypen und Standardgeräte sind in der EPS (Standard Preisliste) ausgewiesen.

Funktion, Schnitte, Symbol

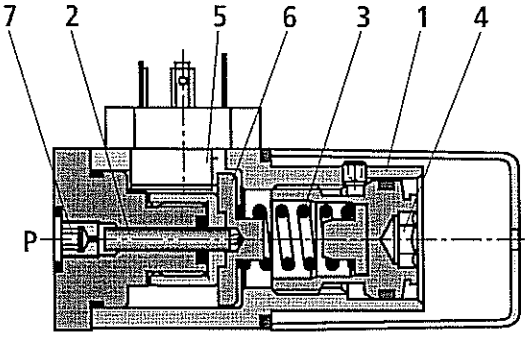
Der hydro-elektrische Druckschalter Typ HED 8 ist ein Kolben-Druckschalter. Er besteht im Wesentlichen aus Gehäuse (1), Einbausatz mit Kolben (2), Druckfeder (3), Verstellelement (4) und Mikroschalter (5).

Liegt der zu überwachende Druck unterhalb des eingestellten Wertes, ist der Mikroschalter (5) betätigt. Der zu überwachende Druck steht über die Düse (7) am Kolben (2) an. Der Kolben (2) stützt sich auf dem Federteller (6) ab und wirkt gegen die stufenlos einstellbare Kraft der Druckfeder (3). Der Federteller (6) überträgt die Bewegung des Kolbens (2) auf den Mikroschalter (5) und gibt diesen bei Erreichnen des eingestellten Druckes frei. Dadurch wird je nach Schaltungsaufbau der elektrische Stromkreis ein- oder ausgeschaltet. Der mechanische Anschlag des Federtellers (6) schützt den Mikroschalter (5) bei plötzlichem Druckabfall vor mechanischer Zerstörung und verhindert bei Überdruck ein Auf-Block-Gehen der Druckfeder (3).

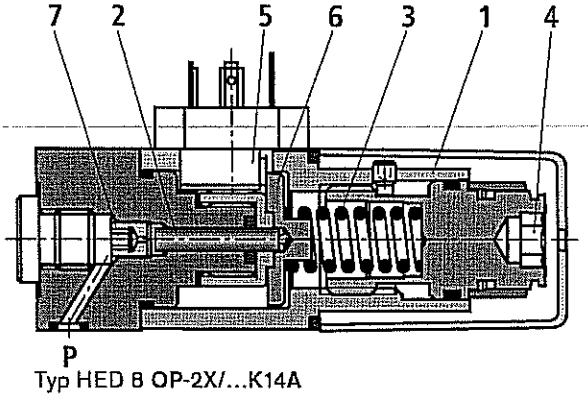
☞ **Hinweis!**

Zur Erhöhung der Lebensdauer sollte der Druckschalter schwingungsarm montiert und vor hydraulischen Druckstößen geschützt werden.

Die zur Dämpfung serienmäßig eingebaute Düse (7) kann entsprechend des geforderten Dämpfungsgrades ausgetauscht und abgestimmt werden.

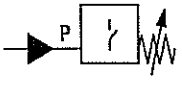


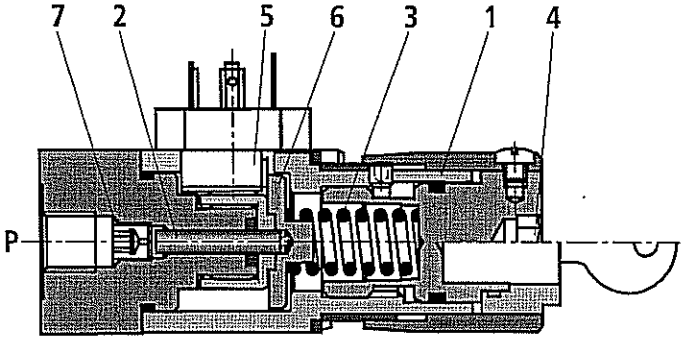
Typ HED 8 OH-2X/...K14
Typ HED 8 OH-2X/...K14S



Typ HED 8 OP-2X/...K14A
Typ HED 8 OP-2X/...K14AS

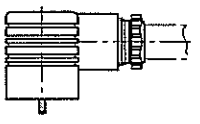
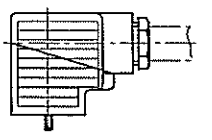
Symbol





Typ HED 8 OA-2X/...K14KW
Typ HED 8 OA-2X/...K14KS

Leitungsdosen nach DIN EN 175301-803

weitere Leitungsdosen siehe RD 08006						
	Material-Nr.					
	ohne Beschaltung	mit Beschaltung (Leuchtanzeige) AC/DC				
	250 V	6 ... 14 V	16 ... 30 V	36 ... 60 V	90 ... 130 V	180 ... 240 V
Farbe schwarz	R901017012	R901017030	R901017048	R901017032	R901017035	R901017037
I_{max}	16 A	4 A	4 A	4 A	4 A	4 A

Technische Daten (Bei Geräteeinsatz außerhalb der angegebenen Werte bitte anfragen!)

allgemein

Masse	– Druckschalter		kg	0,8
	– Zwischenplatte für Höhenverkettung	• NG6	kg	0,8 (Plattenhöhe 40,5 mm, siehe Seite 11 und 12)
				3 (Plattenhöhe 120 mm, siehe Seite 11 und 12)
		• NG10	kg	2 (siehe Seite 13 und 14)
Einbaulage				beliebig
Umgebungstemperaturbereich				–30 bis +50 (NBR-Dichtungen) –20 bis +50 (FKM-Dichtungen)
Vibrationsprüfung nach DIN EN 60068-2-6:1996			g	20 (Testzeit 30 Minuten)
Schockprüfung nach DIN EN 60068-2-27:1993			g	25

hydraulisch

Maximaler Betriebsdruck	bar	630
Druckflüssigkeit		Mineralöl (HL, HLP) nach DIN 51524 [1]; biologisch schnell abbaubare Druckflüssigkeiten nach VDMA 24568 (siehe auch RD 90221); HETG (Rapsöl) [1]; HEPG (Polyglykole) [2]; HEES (Synthetische Ester) [2]; andere Druckflüssigkeiten auf Anfrage
Druckflüssigkeitstemperaturbereich	°C	–30 bis +80 (für NBR-Dichtungen) –20 bis +80 (für FKM-Dichtungen)
Viskositätsbereich	mm^2/s	10 bis 800
Maximal zul. Verschmutzungsgrad der Druckflüssigkeit Reinheitsklasse nach ISO 4406 (c)		Klasse 20/18/15 [3]
Lastwechsel		$\geq 5 \times 10^6$

[1] geeignet für NBR- und FKM-Dichtungen

[2] geeignet nur für FKM-Dichtungen

[3] Die für die Komponenten angegebenen Reinheitsklassen müssen in Hydrauliksystemen eingehalten werden. Eine wirksame Filtration verhindert Störungen und erhöht gleichzeitig die Lebensdauer der Komponenten.

Zur Auswahl der Filter siehe Datenblätter RD 50070, RD 50076, RD 50081, RD 50086 und RD 50088.

Technische Daten (Bei Geräteeinsatz außerhalb der angegebenen Werte bitte anfragen!)

Druck-Einstellbereiche

Druckstufe in bar	Maximaler Betriebsdruck in bar	Druck-Einstellbereich in bar (fallend)	Druckdifferenz pro Umdrehung in bar
50	350	5 ... 50	≈ 19
100	350	10 ... 100	≈ 35
200	350	15 ... 200	≈ 77
350	400	25 ... 350	≈ 120
630	630	40 ... 630	≈ 214

Drehrichtung: im Uhrzeigersinn → Einstelldruckerhöhung

gegen Uhrzeigersinn → Einstelldrucksenkung

elektrisch

Elektrischer Anschluss / Leitungsdose			Steckverbindung nach DIN EN 175301-803, 3polig + PE
Maximaler Anschlussquerschnitt / Leitungsdose		mm^2	1,5
Maximale Schaltfrequenz		1/h	7200
Schutzart nach EN 60529 IEC			IP 65 mit montierter und verriegelter Leitungsdose
Schaltgenauigkeit (Wiederholungsgenauigkeit)			< ± 1 % vom Einstellbereich
Schalter			nach VDE 0630/DIN EN 61058
Übergangswiderstand 1-2; 1-3		mΩ	< 50
Isolationskoordination			Überspannung Kategorie 3
Verschmutzung			Verschmutzungsgrad 3
Prellzeit	– EIN	ms	< 5
	– AUS	ms	< 5

Schaltleistung

Schaltspiele	Spannung *U* in V	ohmische Last max. in A	induktive Last, max. in A
2 Mio	250 AC	2 A für 2 Mio. Schaltungen	0,5 A cos. ϕ 0,6 für 2 Mio. Schaltungen
2 Mio	24 DV	2 A für 2 Mio. Schaltungen	0,5 A für 2 Mio. Schaltungen

EN 61058: 1993

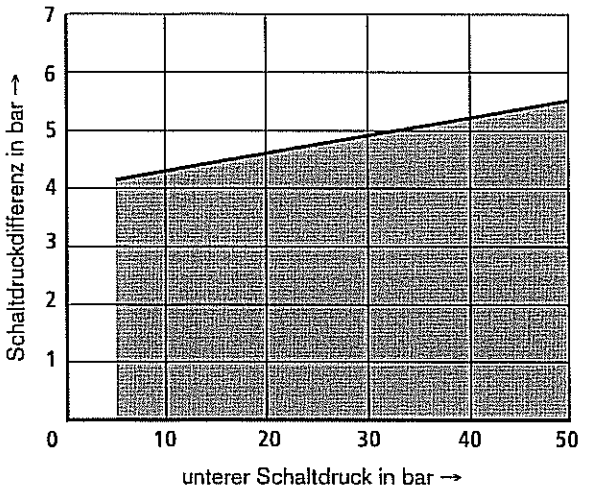
IEC/EN 60947-1:1999 + A1:2000 + A2:2001

IEC/EN 60947-5-1:1997 + A1:1999 + A2:1999

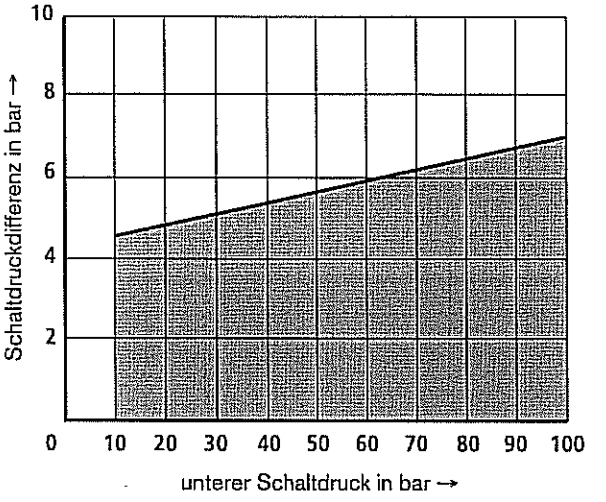
Beim elektrischen Anschluss ist der Schutzleiter (PE ⏚) vorschriftsmäßig anzuschließen.

Schaltdruckdifferenz

Druckstufe 50



Druckstufe 100



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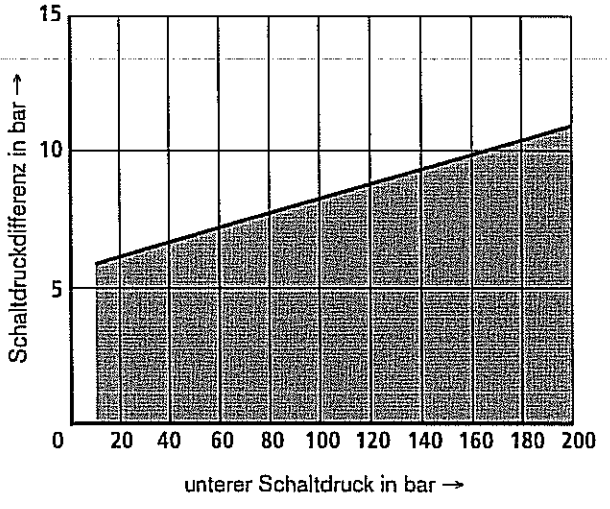
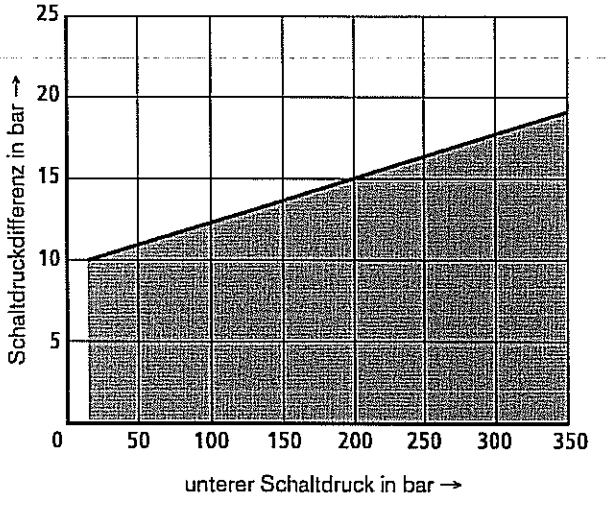
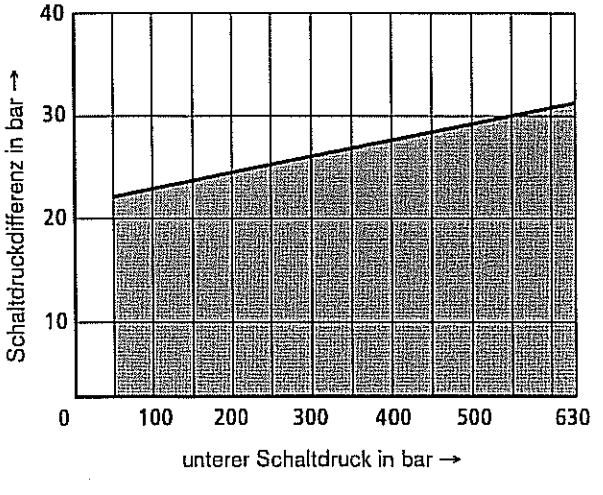


Druckstufe 350



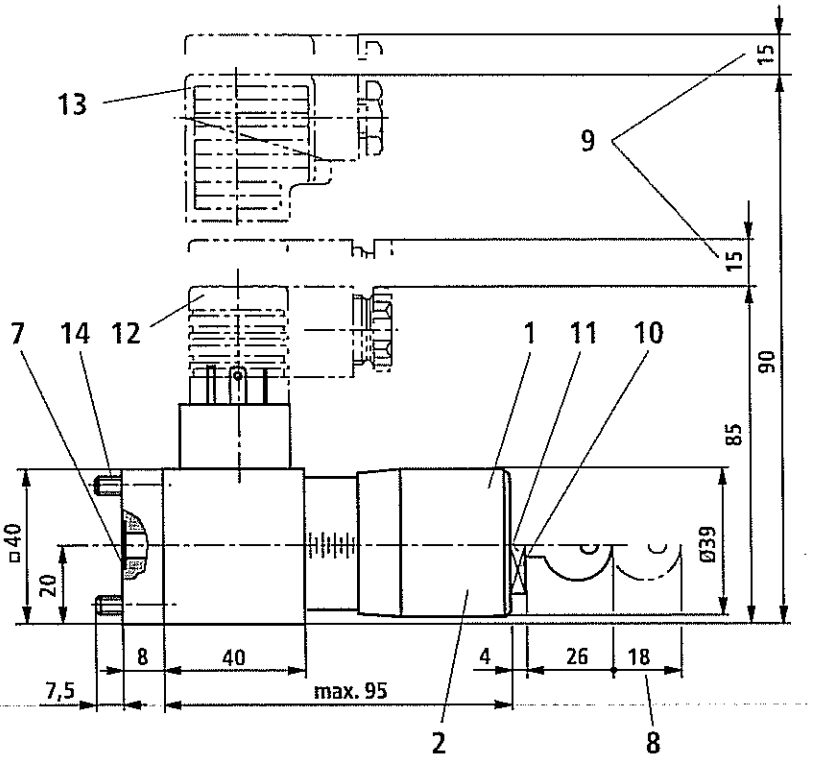
Druckstufe 630



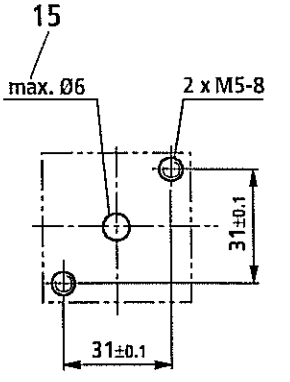
☞ Hinweis!

Die Schaltdruckdifferenz kann sich durch Verminderung der Ölqualität und die Anzahl der Lastwechsel im Laufe der Lebensdauer erhöhen!

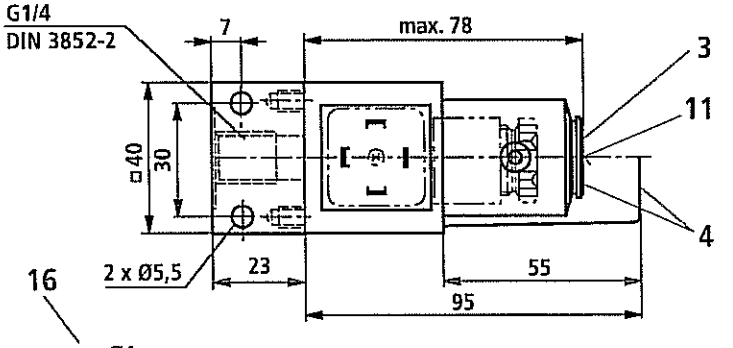
Geräteabmessungen (Nennmaße in mm)



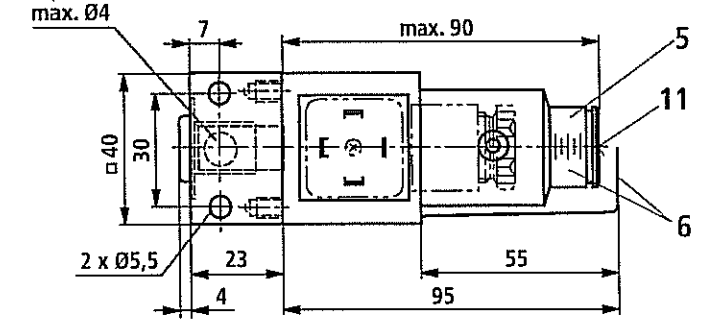
Typ HED 8 OH...



Anschlussmaße

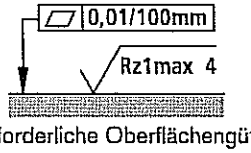


Typ HED 8 OA...



Typ HED 8 OP...

Positionserklärungen siehe Seite 8



Erforderliche Oberflächengüte
der Geräteauflagefläche
(bei Ausführung „OH“ und „OP“)

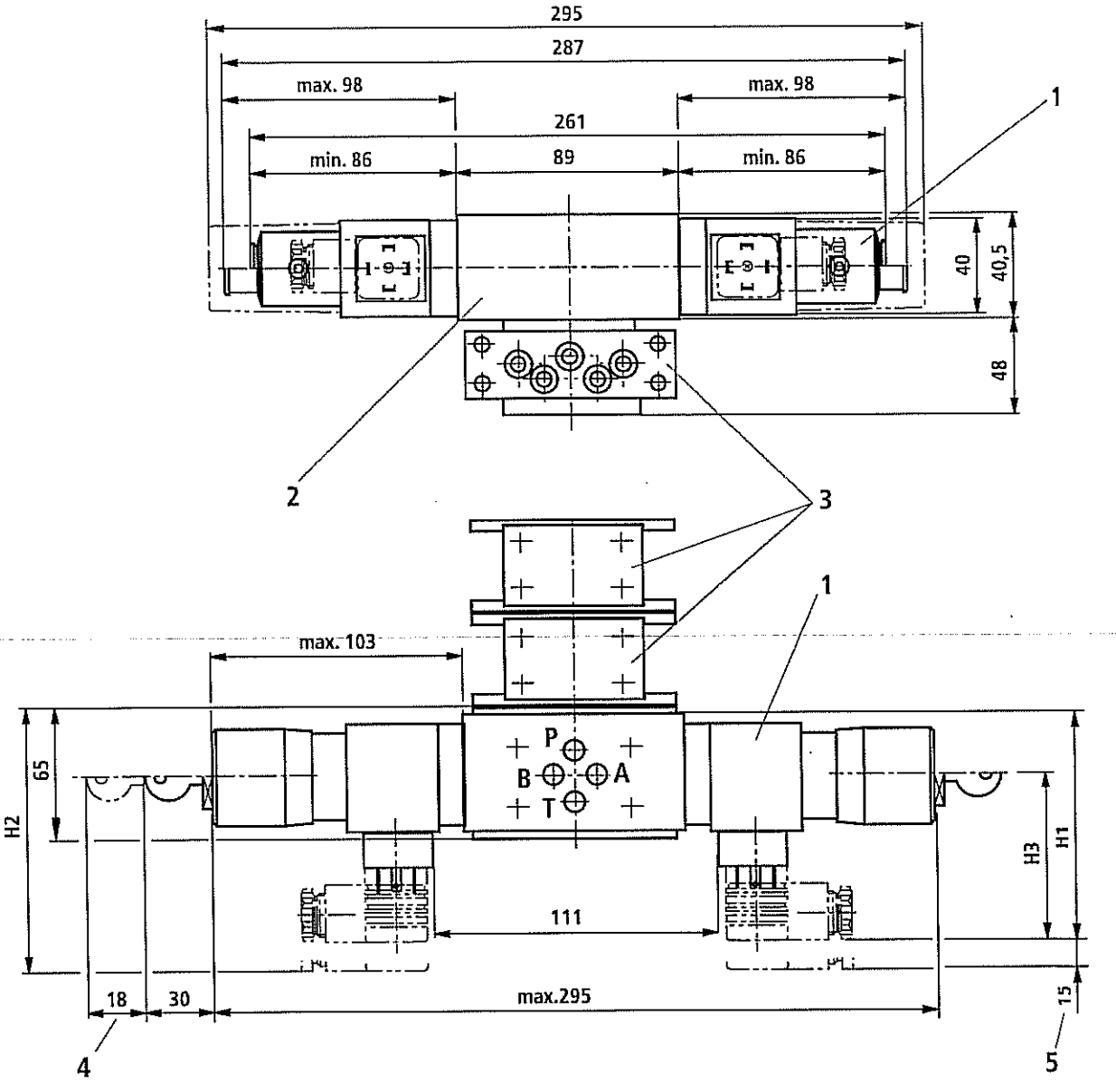
Geräteabmessungen

1 Verstellelement „KW"
2 Verstellelement „KS"
3 Verstellelement „–"
4 Verstellelement „S"
5 Verstellelement „A"
6 Verstellelement „AS"
7 Dichtring
8 Platzbedarf zum Entfernen des Schlüssels
9 Platzbedarf zum Entfernen der Leitungsdose
10 Sechskant SW27 (bei Verstellelement „KS")
11 Innensechskant SW10
12 Leitungsdose ohne Beschaltung (separate Bestellung, siehe Seite 4)
13 Leitungsdose mit Beschaltung (separate Bestellung, siehe Seite 4)
14 **Ventilbefestigungsschrauben** (Typ HED 8 OH...) (separate Bestellung)
- **2 Zylinderschrauben**
  ISO 4762 - M5 x 55 - 10.9-flZn-240h-L
  Reibungszahl $\mu_{ges} = 0{,}09$ bis 0,14,
  Anziehdrehmoment $M_A = 6^{+0,5}$ Nm,
  Material-Nr. **R913000261**

15 Maximaler Durchmesser der Anschlussbohrung des Gegenstückes (Typ HED 8 OH...)
16 Maximaler Durchmesser der Anschlussbohrung des Gegenstückes (Typ HED 8 OP...)

Ventilbefestigungsschrauben
(Typ HED 8 OA... und ...OP...) (separate Bestellung)
- **2 Zylinderschrauben**
  ISO 4762 - M5 x 50 - 10.9-flZn-240h-L
  Reibungszahl $\mu_{ges} = 0{,}09$ bis 0,14,
  Anziehdrehmoment $M_A = 7^{+0,5}$ Nm,
  Material-Nr. **R913000064**

Einbauhinweise: Typ HED 8 OH... in Verkettung NG6 (Nennmaße in mm)



1 Druckschalter HED 8 OH... zum Einsatz in Verkettungen (um 4 x 90° versetzt montierbar)
Die Anbaumöglichkeit des Druckschalters richtet sich nach dem Aufbau der nächstgelegenen Verkettungsanschlussplatte!

2 Zwischenplatte Typ HSZ 06 zum Einsatz des Druckschalters als Verkettungselement

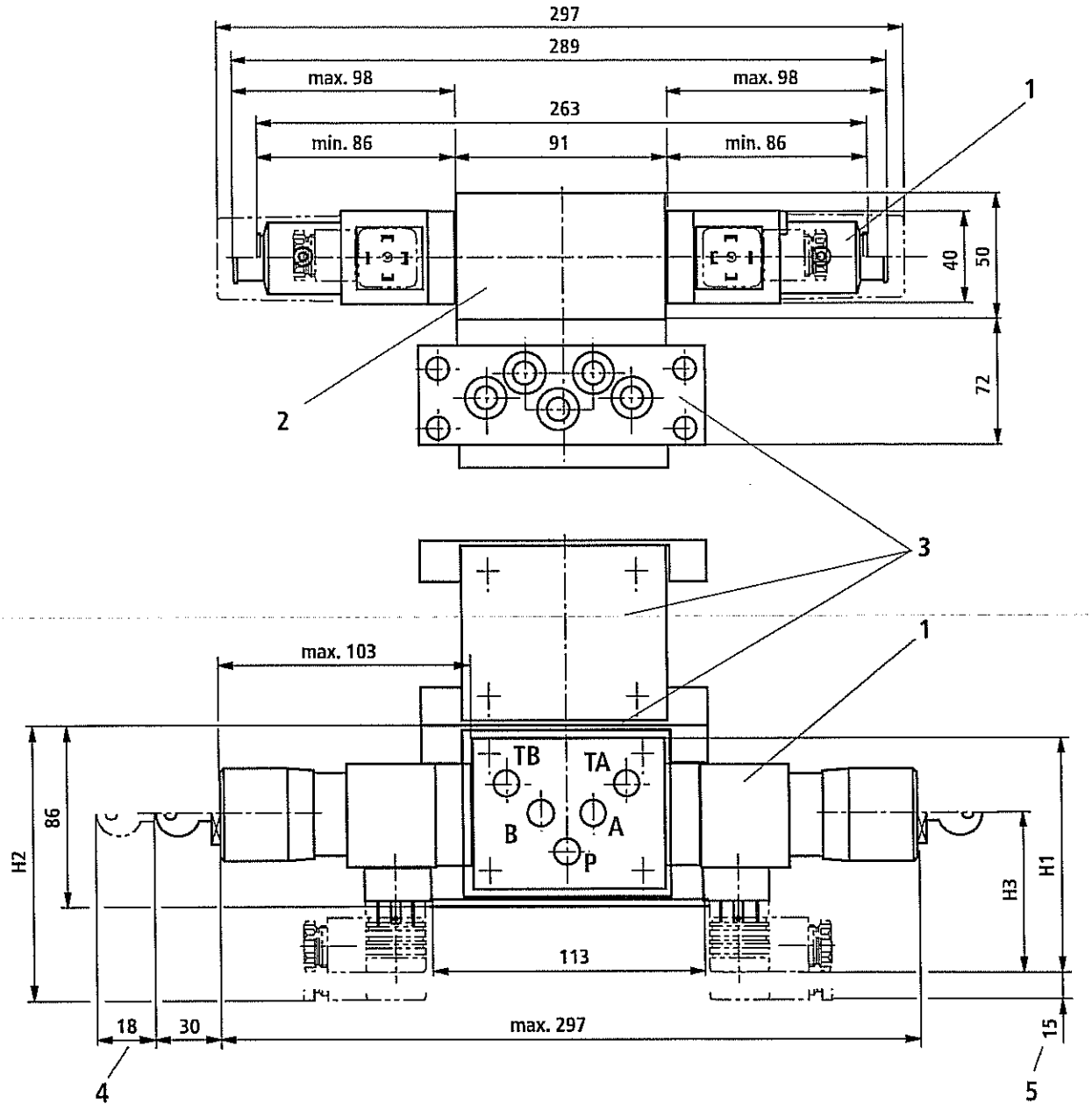
3 Verkettungselemente

4 Platzbedarf zum Entfernen des Schlüssels

5 Platzbedarf zum Entfernen der Leitungsdose

	H1	H2	H3
Leitungsdose ohne Beschaltung	87	98	65
Leitungsdose mit Beschaltung	92	103	70

Einbauhinweise: Typ HED 8 OH... in Verkettung NG10 (Nennmaße in mm)



1 Druckschalter HED 8 OH... zum Einsatz in Verkettungen (um 4 x 90° versetzt montierbar)
Die Anbaumöglichkeit des Druckschalters richtet sich nach dem Aufbau der nächstgelegenen Verkettungsanschlussplatte!

2 Zwischenplatte Typ HSZ 10 zum Einsatz des Druckschalters als Verkettungselement

3 Verkettungselemente

4 Platzbedarf zum Entfernen des Schlüssels

5 Platzbedarf zum Entfernen der Leitungsdose

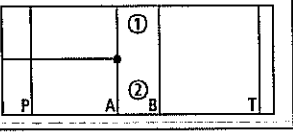
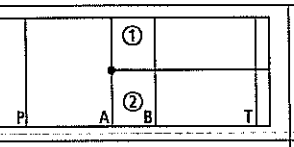
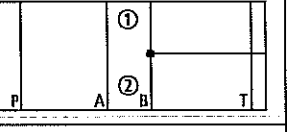
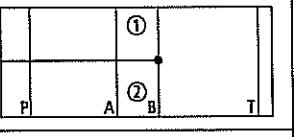
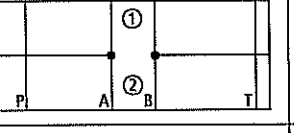
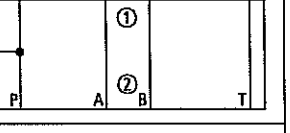
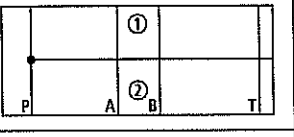
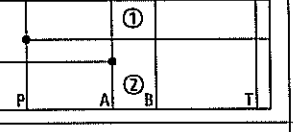
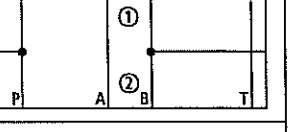
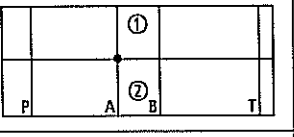
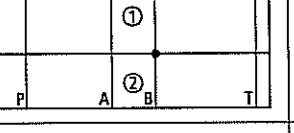
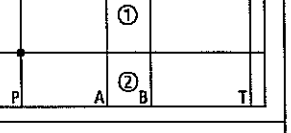
	H1	H2	H3
Leitungsdose ohne Beschaltung	100	108	65
Leitungsdose mit Beschaltung	105	113	70

Bestellangaben: Zwischenplatte NG6 (separate Bestellung)

HSZ	06	A	–3X/	00	*

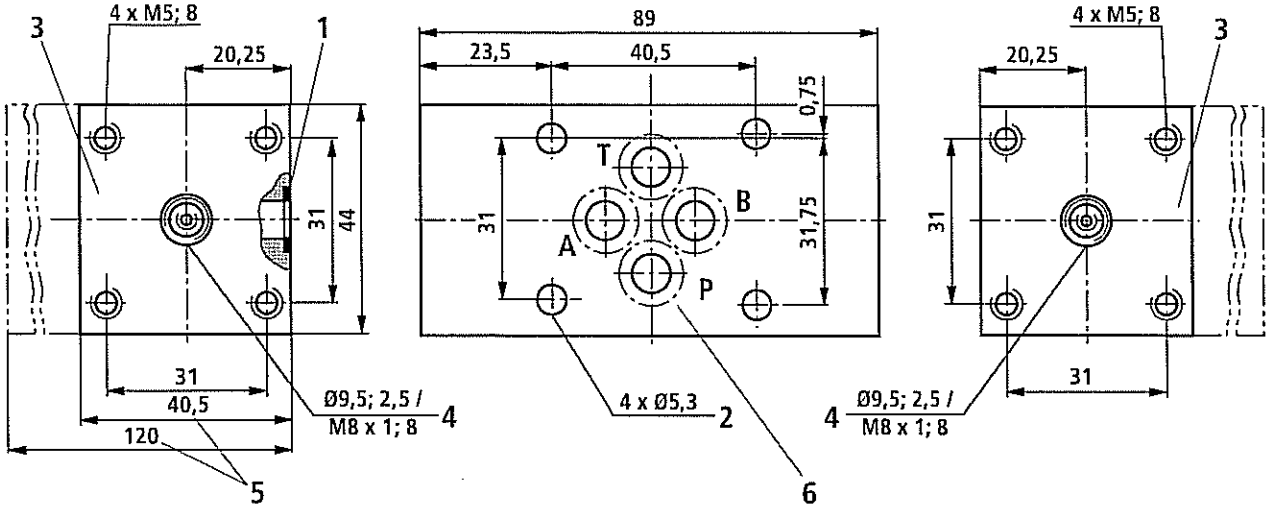
- HSZ: Zwischenplatte
- 06: Nenngröße 6 = 06
- A: Lage der Anschlüsse nach DIN 24340, Form A6 = A
- –3X/: Varianten-Nr. (siehe unten) = 6..; Geräteserie 30 bis 39 (30 bis 39: unveränderte Einbau- und Anschlussmaße) = 3X
- 00: Dichtungswerkstoff
  - M = NBR-Dichtungen
  - V = FKM-Dichtungen
  - (andere Dichtungen auf Anfrage)
  - ⚠ Achtung! Dichtungstauglichkeit der verwendeten Druckflüssigkeit beachten!
- *: weitere Angaben im Klartext

Symbole, Varianten-Nr.: Zwischenplatte NG6 (① = geräteseitig, ② = plattenseitig)

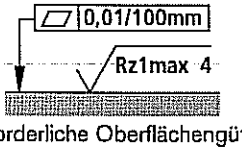
		Druckschalter wirksam im Kanal ...		
	Plattenhöhe			
Varianten-Nummer	– 40,5 mm	608	609	601
	– 120 mm	627	628	620
				
Varianten-Nummer	– 40,5 mm	602	603	604
	– 120 mm	621	622	623
				
Varianten-Nummer	– 40,5 mm	605	606	607
	– 120 mm	624	625	626
				
Varianten-Nummer	– 40,5 mm	610	611	612
	– 120 mm	629	630	631

Geräteabmessungen: Zwischenplatte NG6 (Nennmaße in mm)

Typ HED 8 OH... als Höhenverkettungselement (bis 350 bar)



1 Dichtring
2 Durchgangsbohrung für Ventilbefestigung
3 Anschraubfläche für Druckschalter
4 Messanschluss, wahlweise
5 Plattenhöhe 40,5 mm oder 120 mm, wahlweise
6 Lage der Anschlüsse nach DIN 24340 Form A6



Erforderliche Oberflächengüte
der Plattenauflagefläche

Bestellangaben: Zwischenplatte NG10 (separate Bestellung)

HSZ	10	A	–3X/	00	*

Zwischenplatte

Nenngröße 10 = 10

Lage der Anschlüsse nach DIN 24340, Form A10 = A

Varianten-Nr. (siehe unten) = 6..

Geräteserie 30 bis 39 = 3X
(30 bis 39: unveränderte Einbau- und Anschlussmaße)

weitere Angaben im Klartext

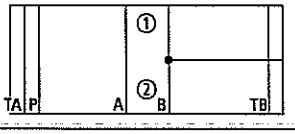
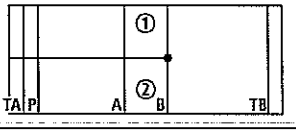
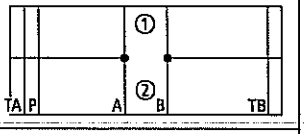
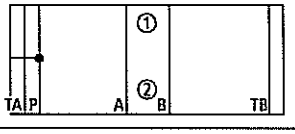
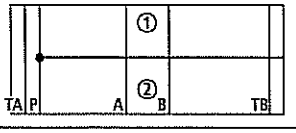
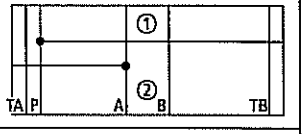
Dichtungswerkstoff

M = NBR-Dichtungen

V = FKM-Dichtungen
(andere Dichtungen auf Anfrage)

⚠ Achtung!
Dichtungstauglichkeit der verwendeten Druckflüssigkeit beachten!

Symbole, Varianten-Nr.: Zwischenplatte NG10 (① = geräteseitig, ② = plattenseitig)

	Druckschalter wirksam im Kanal ...		
			
Varianten-Nummer	**601**	**602**	**603**
			
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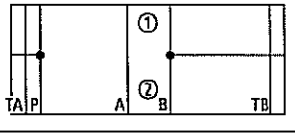
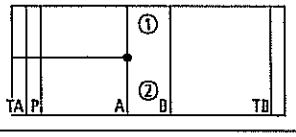
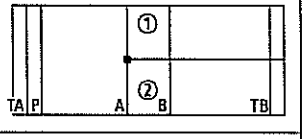
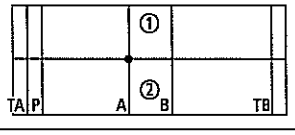
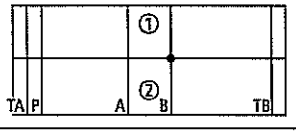
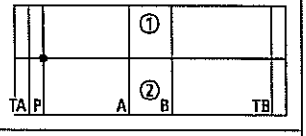
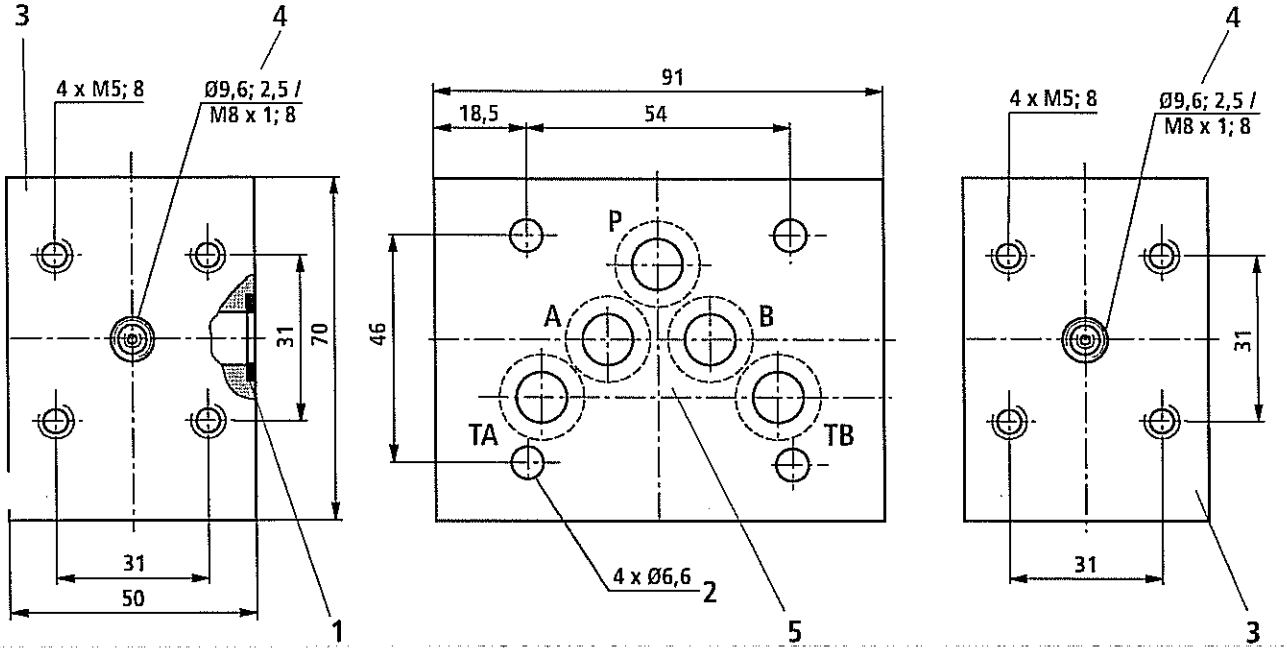
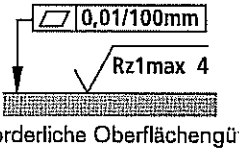
			
Varianten-Nummer	**607**	**608**	**609**
			
Varianten-Nummer	**610**	**611**	**612**

Geräteabmessungen: Zwischenplatte NG10 (Nennmaße in mm)

Typ HED 8 OH... als Höhenverkettungselement (bis 350 bar)



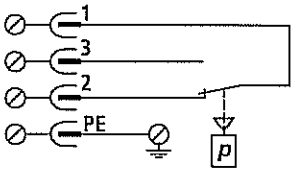
1 Dichtring
2 Durchgangsbohrung für Ventilbefestigung
3 Anschraubfläche für Druckschalter
4 Messanschluss, wahlweise
5 Lage der Anschlüsse nach DIN 24340 Form A10



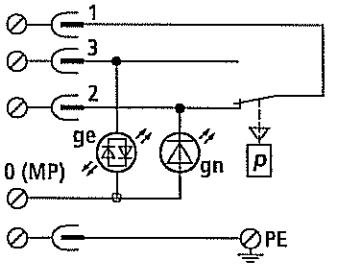
Erforderliche Oberflächengüte
der Plattenauflagefläche

Anschlussbelegung

ohne Leuchtanzeige

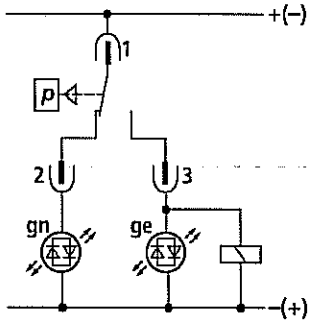


mit Leuchtanzeige

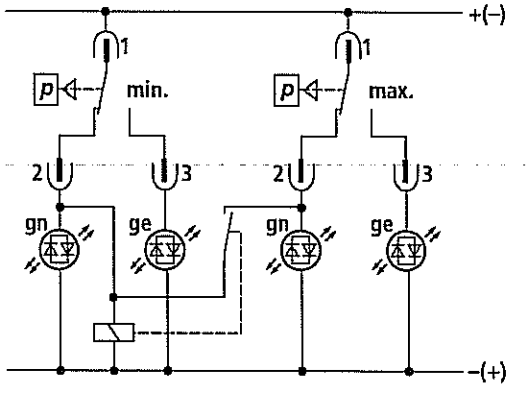


Schaltungsbeispiele

Einfache Schaltung (1 x HED 8)



Differenz-Schaltung mit Schließer (2 x HED 8)



Schaltfunktion

Klemmen 1-2: Bei Druckanstieg (p) Kontakt öffnend

Klemmen 1-3: Bei Druckanstieg (p) Kontakt schließend

Notizen

Bosch Rexroth AG
Hydraulics
Zum Eisengießer 1
97816 Lohr am Main, Germany
Telefon +49 (0) 93 52 / 18-0
Telefax +49 (0) 93 52 / 18-23 58
documentation@boschrexroth.de
www.boschrexroth.de

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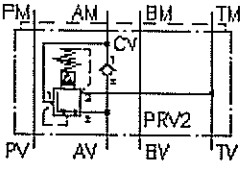
3 way press. reg. valve CETOP 5 (sandwich plate) in A,pilot operat.

DMVZ-10.-A02./..

Symbol:

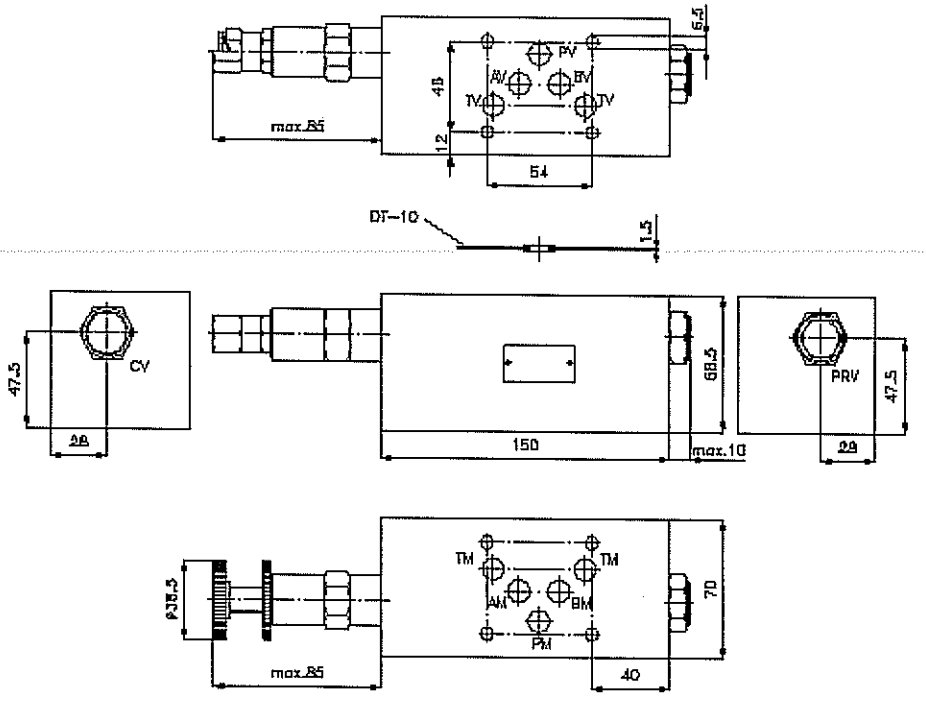


Nom. pressure:
350 bar

Nominal flow:
40 l/min.

IMAV-Hydraulik GmbH
Breite Strasse 10
D-40670 Meerbusch (Osterath)
Phone +49 (0)2159 - 9188.0
Fax +49 (0)2159 - 4242
E-mail: info@imav.com
Internet: http://www.imav.com

IZ-430-401-00
(Subject to change!)



3 way press. reg. valve CETOP 5 (sandwich plate) in A,pilot operat.

DMVZ-10.-A02./..

IMAV-Hydraulik GmbH
Breite Strasse 10
D-40670 Meerbusch (Osterath)
Phone +49 (0)2159 - 9188.0
Fax +49 (0)2159 - 4242
E-mail: info@imav.com
Internet: http://www.imav.com

IZ-430-401-00
(Subject to change!)

Ordering example:

DMVZ - 10A - A 02 C / 12
A B C D E F

Model code:

A **design**
pressure regulaton valve
adjustable
pilot operated
spool type valve
with mounting interface DIN 24340 form A
sandwichplate design

B **size and material**
10A = aluminum (F37)
10S = steel (9SMnPb28K resp. GGG-40)

C **function mode**
A = in A acting

D **pressure reducing valve**
02 = PRV2-10.-.. (pilot operated) see data sheet no.: MP-210-101-00

E **adjustment**
C = cap
K = handknob

F **pressure range (PRV2)**
03 = 3.4 - 21 bar
20 = 6.9 - 138 bar
35 = 17.2 - 241 bar

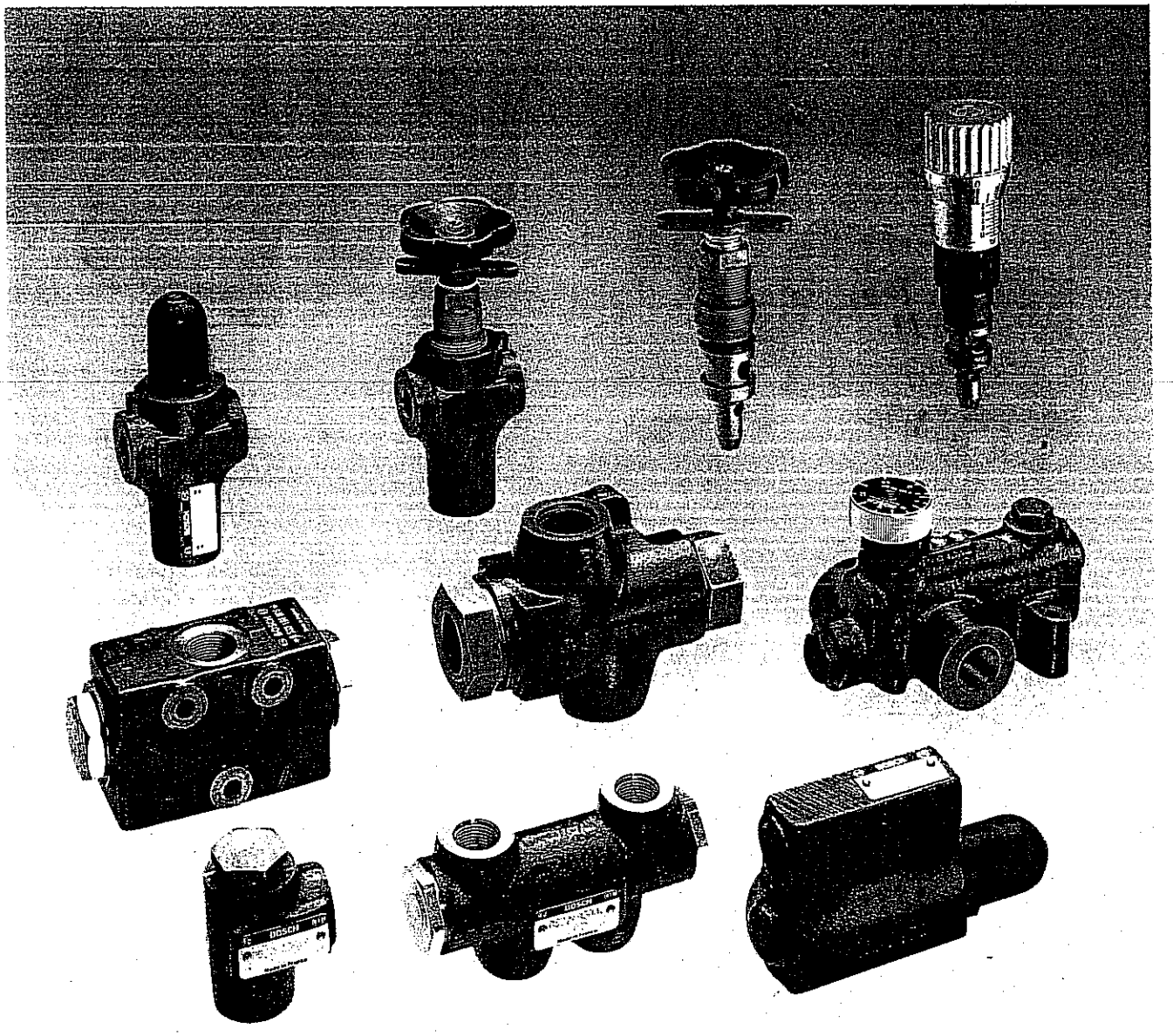
Technical Data:

nominal pressure:	250 bar (A) 350 bar (S)
nominal flow:	40 l/min
weight:	2. 2 / 5.6 kg (A/S)
pressure regulator valve:	PRV2-10.-.. see datasheet no. MP-210-101-00
included:	DT-10 = sealing plate with vulcanized O-ring (Viton FPM)

Fahrzeughydraulik
Mobile Hydraulics
Hydraulique mobile

Druck-, Strom-, Sperrventile
Pressure control/flow control/check valves
Valves de réglage de pression/ du débit/clapets anti-retour

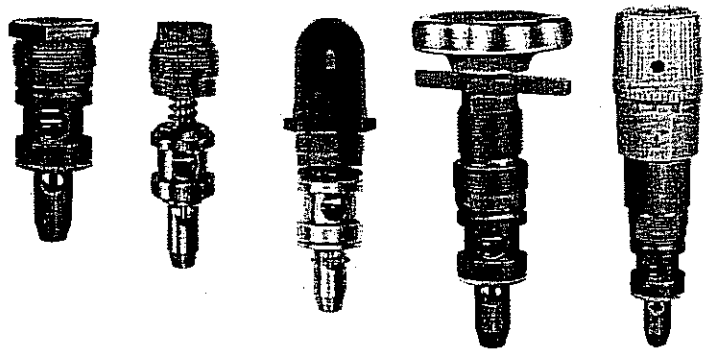
7/4



Ausgabe
Version
Version 1.0

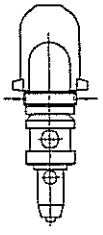
BOSCH
Automationstechnik

Druckbegrenzungsventil für Blockeinbau
Pressure relief valve cartridge type
Limiteur de pression type cartouche



0 532 VA 01 N - 3 0 0 - H - 1 AO

Gewinde Thread Filetage		N: Perbunan * V: Viton ** * ® Bayer ** ® Dupont	p [bar]	Verstellung Adjustment Réglage	H K D F	kg	Ausf. Version Modèle	⊖
10	M 30 x 1,5	V	6	fest fixed fixé	H	0,2	A	0 532 001 148
		N	12					0 532 001 060
			15					0 532 001 055
			25					0 532 001 039
			30					0 532 001 113
			50					0 532 001 059
			60					0 532 001 142
			70					0 532 001 127
			80					0 532 001 032
			90					0 532 001 036
			100					0 532 001 034
			120					0 532 001 048
			130					0 532 001 057
			150					0 532 001 041
			160					0 532 001 029
			170	p_{max} = 380 bar				0 532 001 147
			175					0 532 001 040
			180					0 532 001 050
			190					0 532 001 037
			200					0 532 001 052
			220					0 532 001 058
			250					0 532 001 051
			280					0 532 001 061
			300					0 532 001 043
		V	300					0 532 001 049
		N	320	RV [1]				0 532 001 145
			25	RV [1]				0 532 001 163
			170	RV [1]				0 532 001 159
			180	RV [1]				0 532 001 155
			300	RV [1]				0 532 001 149
			30				B	0 532 001 144
			180					0 532 001 134
			200					0 532 001 118
			230					0 532 001 140
			270					0 532 001 133
			280	p_{max} = 380 bar				0 532 001 146

Gewinde / Thread / Filetage		N: Perbunan * V: Viton ** * ® Bayer ** ® Dupont		p [bar]	Verstellung / Adjustment / Réglage	H D F	K kg	Ausführung / Version / Modèle	⊜
10	M 30 x 1,5 	V		5 ... 35		K	0,3		0 532 002 065
		N		5 ... 35					0 532 002 062
				10 ... 15					0 532 002 011
				15 ... 50					0 532 002 012
				7 ... 67					0 532 002 042
				40 ... 100					0 532 002 015
		V		40 ... 100					0 532 002 066
		N		50 ... 300					0 532 002 014
				50 ... 300					0 532 002 055
				70 ... 180					0 532 002 002
		V		70 ... 180					0 532 002 016
		N		100 ... 250					0 532 002 013
		V		100 ... 250					0 532 002 019
				100 ... 320	p_{max} = 380 bar				0 532 002 041
		N		110 ... 135					0 532 002 061
				40 ... 200	RV [1]				0 532 002 051
		V		50 ... 350					0 532 002 046
		N		50 ... 350	RV [1]				0 532 002 050
				50 ... 380	RV [1]				0 532 002 058
				1 ... 15					0 532 002 048
				70 ... 180					0 532 002 049
10	M 30 x 1,5	N		1 ... 10		D	0,4		0 532 003 012
				1 ... 35					0 532 003 032
				15 ... 150					0 532 003 011
				40 ... 280					0 532 003 033
					p_{max} = 380 bar				
10	M 30 x 1,5	N		50 ... 315		F	0,5		0 532 008 001
				15 ... 50					0 811 100 078 ***
				50 ... 300					0 811 100 079
					p_{max} = 380 bar				
Schlüssel, Schließzylinder, Gewindestift Key, Look cylinder, Headless setscrew Clef, Vérin de fermeture, Vis sans tête									1 817 001 081
Schlüssel Key Clef									1 811 982 002
Drehknopf Rotory knob Bouton rotatif									1 817 020 016

[1]) Rückschlagventil
[1]) Check valve
[1]) Clapet anti-retour

*** ⊜ 1 817 001 081 im Lieferumfang enthalten
included
compris

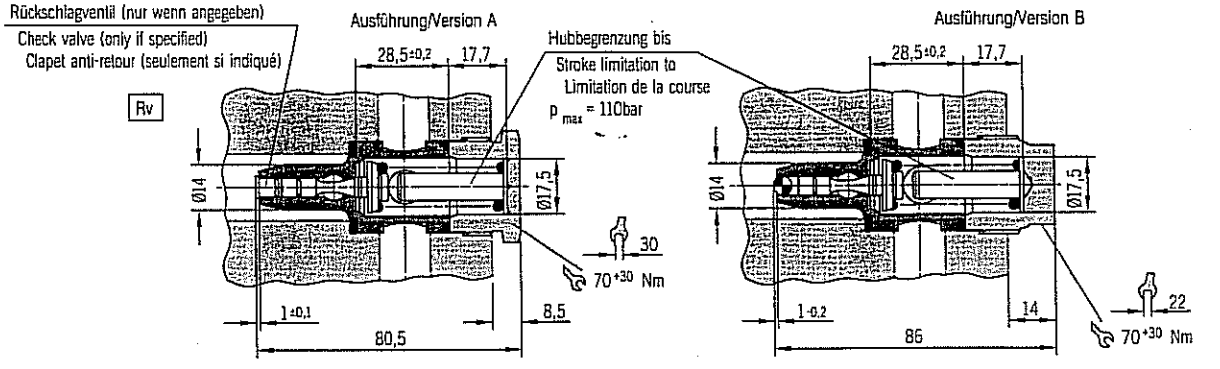
► Technische Daten siehe Seite 13, 14

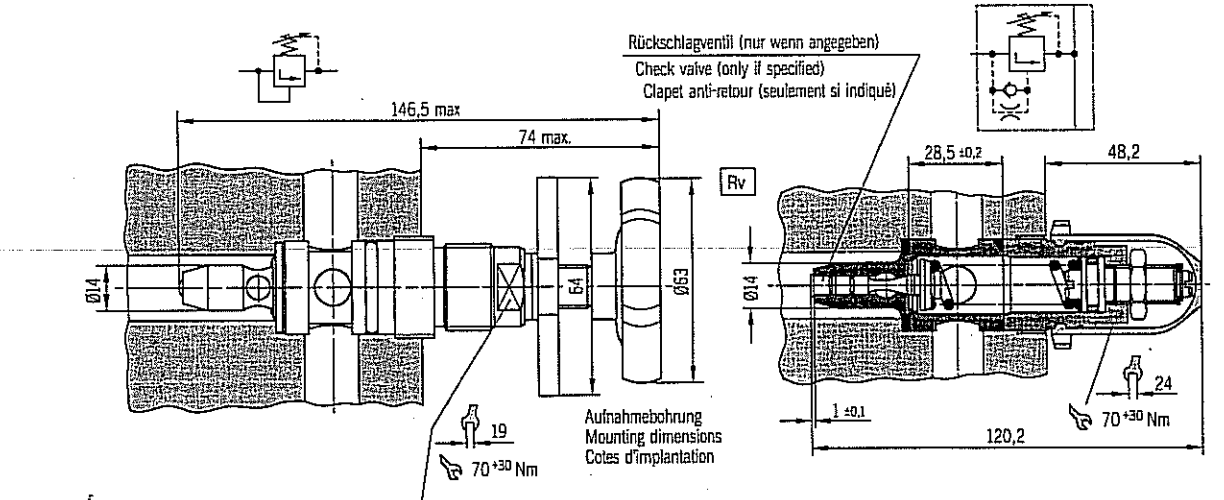
►► Specifications see page 13, 14

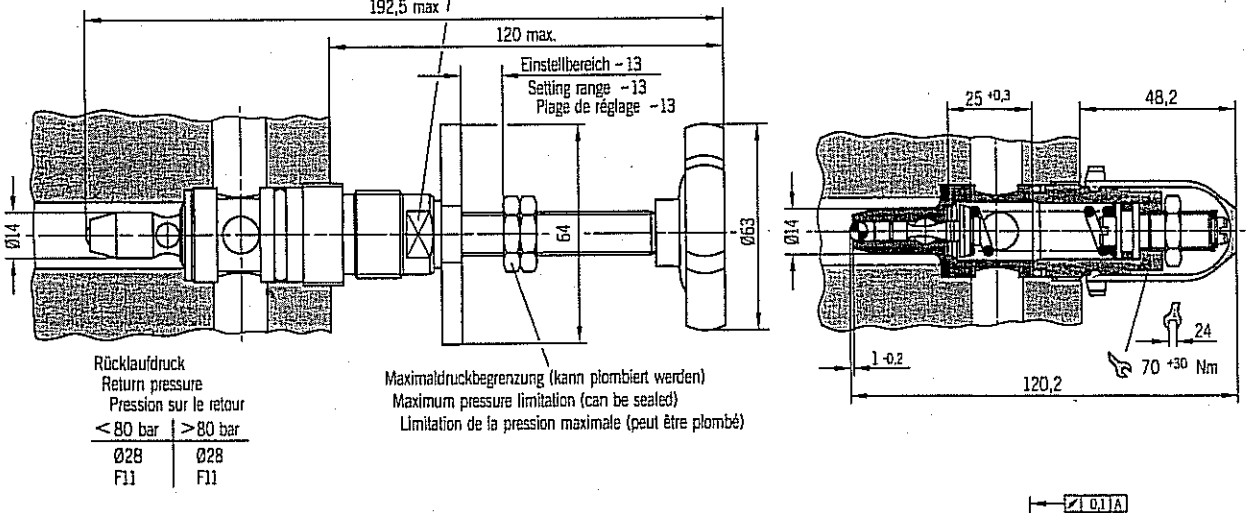
►►► Spécifications voir page 13, 14

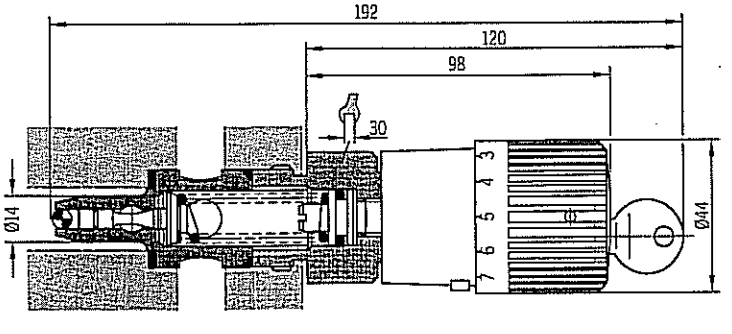
Abmessungen
Dimensions
Cotes d'encombrement

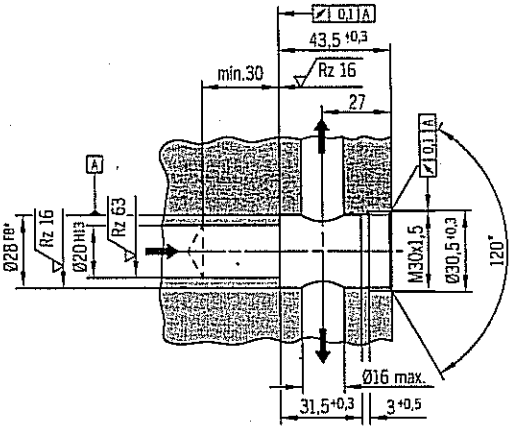
Sämtliche Dichtringe lose mitgeliefert
Sealing rings delivered with valve
Les joints sont compris dans la fourniture









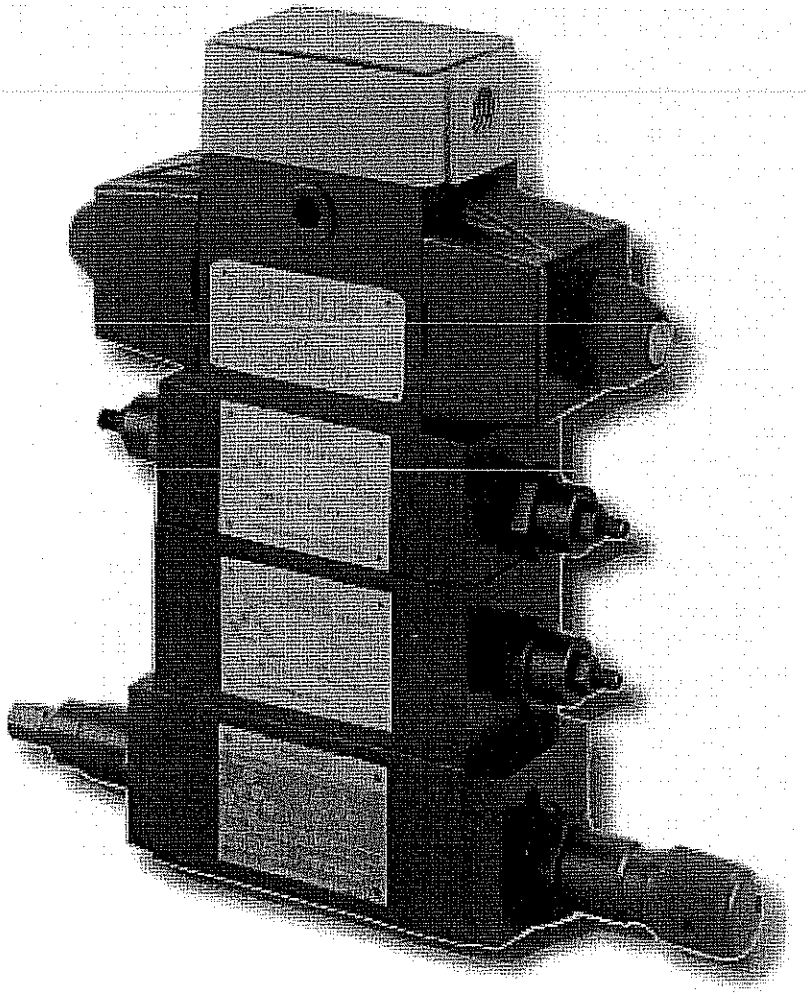


Vickers®

SystemStak™

SystemStak™ Valves

ISO 4401 -05 size, 315 bar (4500 psi) and 120 l/min (32 USgpm) maximum ratings
Pressure relief and reducing, sequence, counterbalance, and flow control functions



Revised 11/97

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General Description

Vickers SystemStak™ valves make compact hydraulic systems in which modular valves are "sandwich" mounted between a directional valve and a standard mounting surface. Compact design improves system response by elimination of external fluid conductors, thereby resulting in elimination of resonant sounds which are noisy and lead to leakage. The design of these valves is well proven and offers opportunities for achieving small control assemblies, especially when the valves are used with multi-station manifolds.

Three mounting surfaces are available for interfacing with directional valves and are coded "5", "5N", or "5P" in the model numbers of Vickers SystemStak valves. The "5" interface accepts Vickers DG4S4 directional valves and other directional valves with a standard ISO 4401-05, NFPA-D05, ANSI/B93.7M size D05 or CETOP-5 port pattern. "5N" and "5P" NFPA-D05 interfaces accept the Vickers directional valves listed on page 38.

Each valve "stak" can be configured to provide the specific combination of functions required to meet the system's needs.

SystemStak valves are divided into two groups:

1. Valves acting in the pressure and/or tank lines ("P" and/or "T")

DGMC	Relief valve
DGMDC	Direct check
DGMFN	Flow control
DGMR1	Sequence valve
DGMX2	Pressure reducing

The general rule for this group is that the DGMC relief valve be placed nearest the subplate or manifold.

The DGMDC direct check valve should be placed nearest the directional control valve.

The DGMR1 sequence valve should be the farthest valve from the directional valve. The DGMR1 must be mounted directly to a subplate or manifold with a drain port, to externally drain the DGMR1 at the mounting face.

2. Valves acting in the service lines ("A" and/or "B")

DGMC	Relief valve
DGMC2	Dual relief valve
DGMDC	Direct check
DGMPC	Pilot operated check
DGMFN	Flow control
DGMR	Counterbalance

The general rule for this group is that the DGMC system relief valve be the farthest valve from the directional valve.

When using a DGMPC with a DGMFN (meter-out), the DGMPC should be nearest the directional valve.

Features and Benefits

- **Reduced space requirements**
  Stackable SystemStak valves, used with ISO 4401-05, CETOP 5 (NFPA-D05) directional controls, provide compact cost-effective control of actuator direction, speed and force.

- **Reduced installed cost**
  SystemStak valves eliminate all intervalve piping and connections, thereby reducing the number of potential leakage points. Installed cost is less than when using conventional subplate- or line-mounted valves.

- **Versatile & easy to install**
  SystemStak valves have all the internal passages necessary to serve the directional valve mounted above them. Any directional valve with a standard ISO 4401-05, NFPA-D05, ANSI/B93.7M size D05 or CETOP-5 port pattern can be used with ISO 4401-05 SystemStak valves.

  Vickers bolt-extender kits simplify valve installation by permitting each valve body to be separately and quickly installed, and correctly torqued down. The kits also allow the directional valve to be removed for service or replacement without disturbing the stack.

- **Rugged & reliable**
  Internal working parts are produced from hardened steel, and reside in a continuous-cast ductile (spheroidal graphite) iron body. Excellent reliability is ensured, even in high pressure applications. Working parts are serviceable without removing valves from the stack.

Easy to Understand, Easy to Design

SystemStak circuitry is best shown using slightly different symbols than those for traditional valve configurations. Each SystemStak symbol has the same basic form and size as shown in Figure 1.

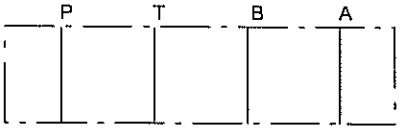


Figure 1.

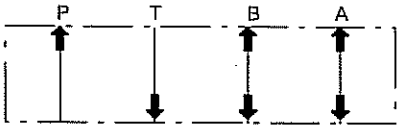


Figure 2.

For ease of understanding, remember the directions of flow for each line, and that all four flow paths pass through each valve (see Figure 2). For clarity, directional valves are drawn vertically in SystemStak circuit diagrams (see Figure 3.)

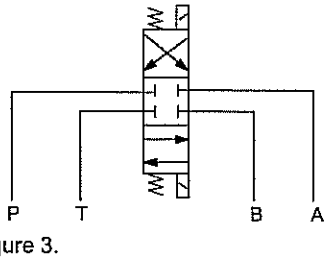


Figure 3.

Each station (valve stack) is a combination of functions. When designing and assembling SystemStak valves, care must be taken to ensure that they interact as required by stacking the functions in the correct sequence (see Figure 4). Direct check valves should be placed closest to the directional valve. Relief valves should normally be positioned next to the mounting surface (i.e. at the bottom of the stack). When both a flow control and a pilot operated check valve is required, it is recommended that the flow control valve be between the check valve and the actuator to prevent check valve chatter.

A combination of directional valve, SystemStak valve(s) and subplate/ manifold block (Figure 5 single station subplate and Figure 6 multi station manifold) completes the assembly.

Figure 7 represents a complete SystemStak system, showing typical use of functions available from this range. The circuit diagram also shows the use of a tapping plate for accessing line pressure readings, and a blanking plate to close off an unused station of a multi-station manifold.

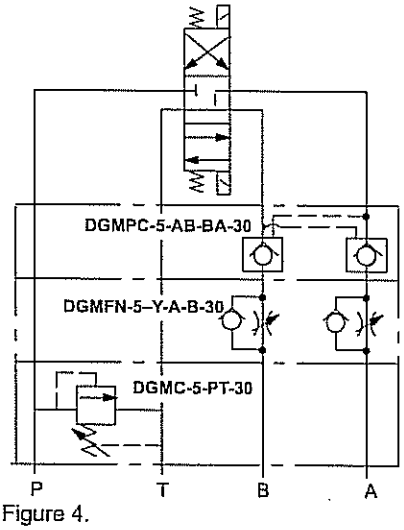


Figure 4.

Figure 5.

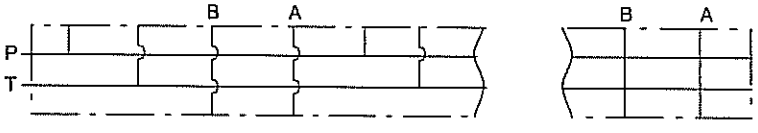


Figure 6.

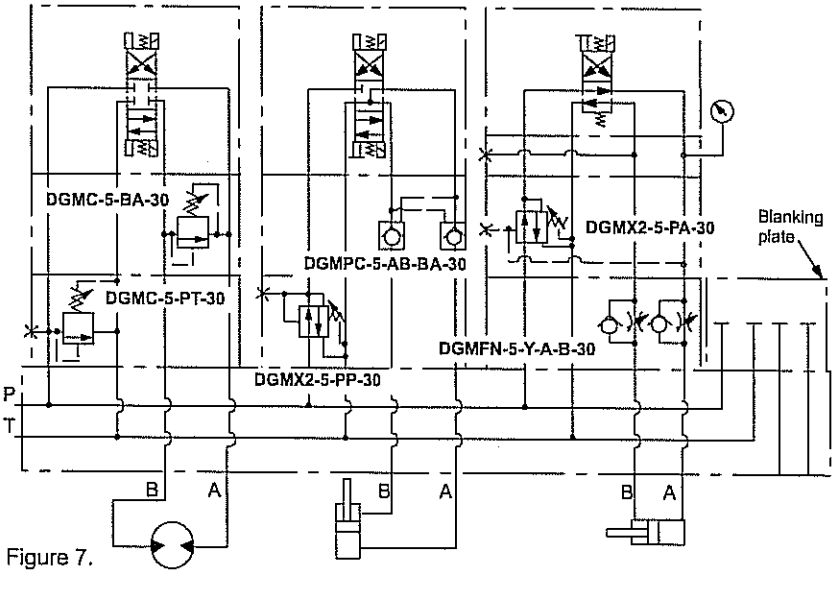


Figure 7.

General Description

These valves are adjustable, non-compensated flow restrictors. An integral check valve around the regulating orifice allows free flow in one direction and metered flow in the other.

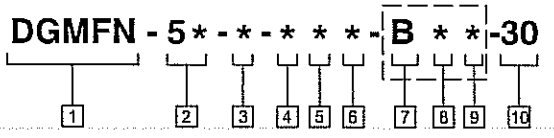
Control is available in "A" only, "B" only, and "A" and "B" ports as an "X" type (meter–in) or "Y" type (meter-out).

The "P" port is available only in the "X" type (meter-in) and does not contain a reverse flow check.

The valve flow setting is adjustable by means of either a hex key adjusting screw and locknut, a hand-adjust knob, or a micrometer knob with keylock.

A normal or fine metering capability is available. See the pressure drop curves on page 26 for detailed performance difference.

Model Code



1 Valve function

Manifold or subplate mounted flow control valve.

2 Interface

5 - ISO 4401-AC-05-4-A, CETOP 5 Size 5 RP35H ANSI/NFPA D05
5N - NFPA D05 (Alt. A)
5P - NFPA D05 (Alt. B)

3 Direction of flow

X - Meter-in
Y - Meter-out

4 Port operated upon

A - Cylinder port "A" (single or dual type)
B - Cylinder port "B" (single type only)
P - Pressure port (single type only)

5 Adjustment range

1 - Fine control
2 - Normal control

6 Adjustment device

H - Knob adjuster
K - Micrometer knob with keylock
W - Screw with locknut

7 Port operated upon: second function

(Omit for single flow control models.)
B – B cylinder port (Dual type)

8 Adjustment range: second function

(Omit for single flow control models.)
1 - Fine control
2 - Normal control

9 Adjustment device: second function

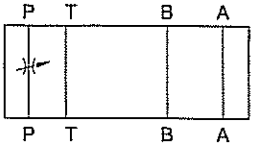
(Omit for single flow control models.)
H - Knob adjuster
K - Micrometer knob with keylock
W - Screw with locknu

10 Design number - 30 series

Subject to change. Installation dimensions unaltered for design numbers 30 to 39 inclusive.

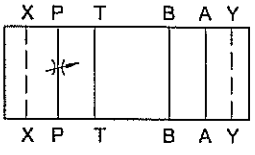
Functional Symbols

DGMFN-5-**X**-P**-30

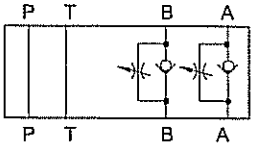


DGMFN-5N-**X**-P**-30
(models not available)

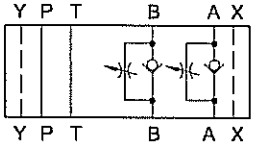
DGMFN-5P-**X**-P**-30



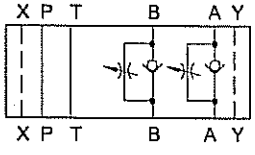
DGMFN-5-**X**-A**-B**-30



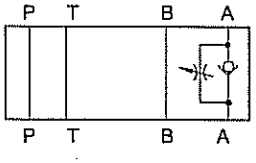
DGMFN-5N-**X**-A**-B**-30



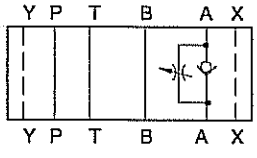
DGMFN-5P-**X**-A**-B**-30



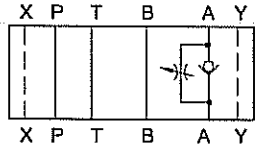
DGMFN-5-**X**-A**-30



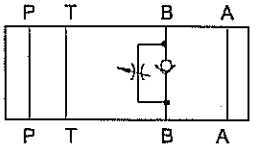
DGMFN-5N-**X**-A**-30



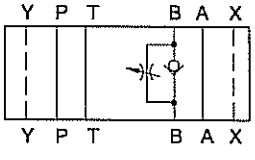
DGMFN-5P-**X**-A**-30



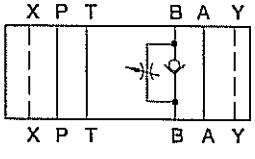
DGMFN-5-**X**-B**-30



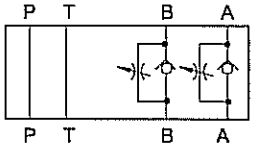
DGMFN-5N-**X**-B**-30



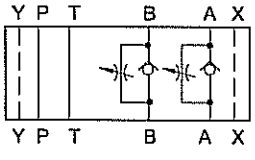
DGMFN-5P-**X**-B**-30



DGMFN-5-**Y**-A**-B**-30



DGMFN-5N-**Y**-A**-B**-30



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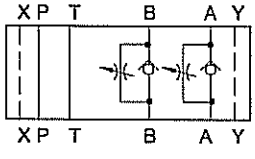
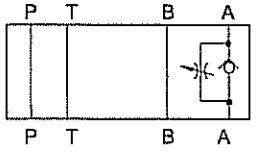
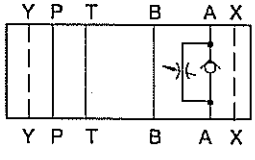


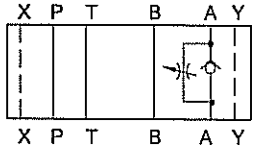
DGMFN-5-**Y**-A**-30



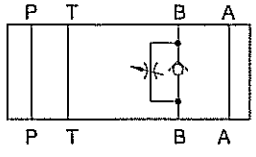
DGMFN-5N-**Y**-A**-30



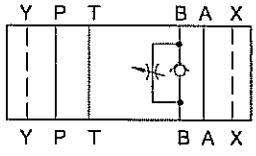
DGMFN-5P-**Y**-A**-30



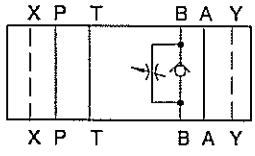
DGMFN-5-**Y**-B**-30



DGMFN-5N-**Y**-B**-30



DGMFN-5P-**Y**-B**-30



Operating Data

Basic Characteristics

Maximum flow: ..... 120 l/min (32 USgpm)
Maximum operating pressure: ..... 315 bar (4500 psi)
Operating temperature: ..... 20° to 50° C (70° to 120° F)
Weight: ..... 3,1 kg (6.8 lbs.)

Minimum Controlled Flow/No-Flow Leakage

Internal leakage will vary from valve to valve and with the pressure differential across the check.
Approximate levels are:

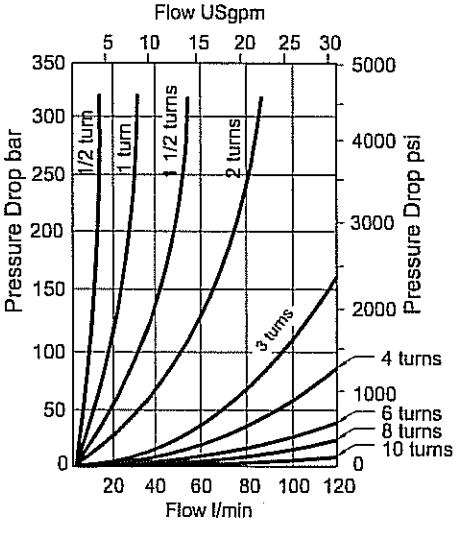
Pressure Drop bar (psi)	Leakage* cc/min (in³/min)
50 (725)	160 (9.5)
100 (1450)	320 (19)
200 (2900)	640 (38)
315 (4500)	990 (60)

* Equals minimum controllable flow rate at the pressures stated.

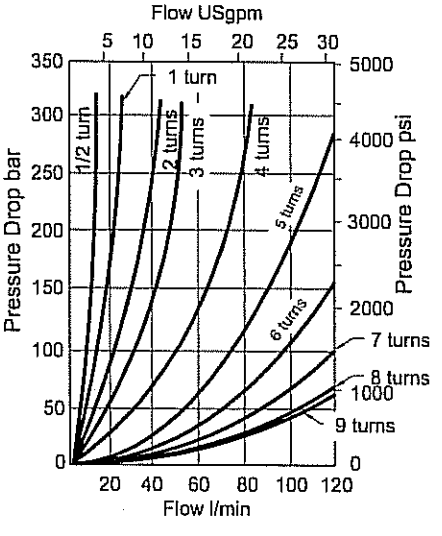
Pressure Drop

The curves below show the pressure drop through individual flow passages. Curves labeled "metered flow/pressure drop" refer to the pressure drop through only the passage containing the flow control regulating orifice. Total valve insertion loss is a value derived from graph 1 or 2 plus the appropriate values of lines 1, 2 and 3 from graph 3.

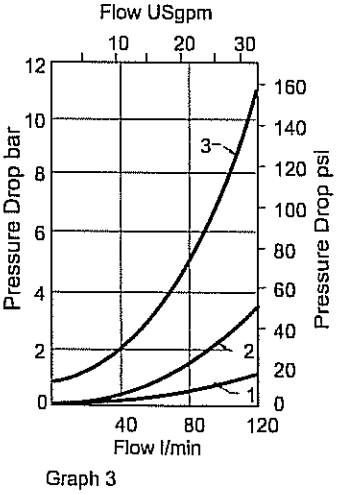
Graph 1
Metered flow pressure drop.
Normal adjustment – "2" models (see model code, page 24).



Graph 2
Metered flow pressure drop.
Fine adjustment – "1" models (see model code, page 24).



Graph 3
Free flow pressure drop across check valve.



Graph 3

1 – "P" port of all models except DGMFN-5-X-P**-30
"B" and "T" ports of DGMFN-5-X-P**-30

2 – "T" port of all models except DGMFN-5-X-P**-30
"A" ports of DGMFN-5-X-P**-30

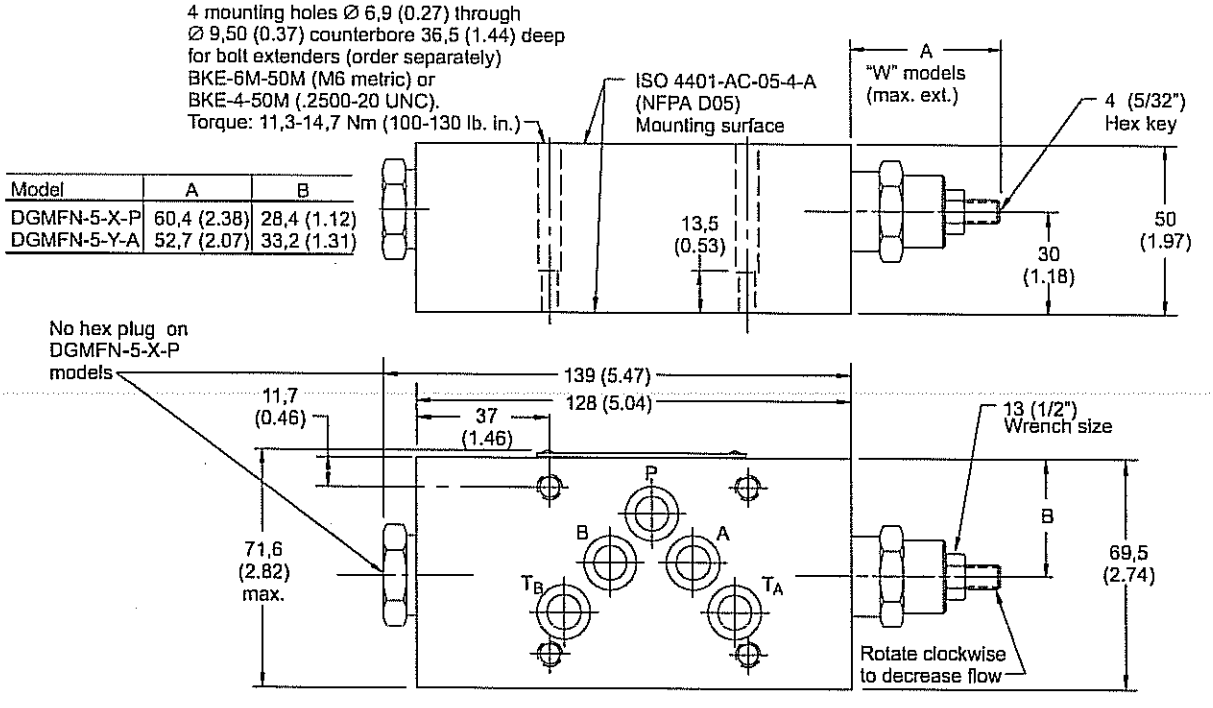
3 –Pressure drop across reverse free flow check valve

Note: "Turn" or "Turns" on curves in graphs 1 and 2, above, refer to turn of adjustment device from fully closed position.

DGMFN-5-X-P & DGMFN-5-Y-A
Single Flow Controls

mm (inches)

3rd angle projection

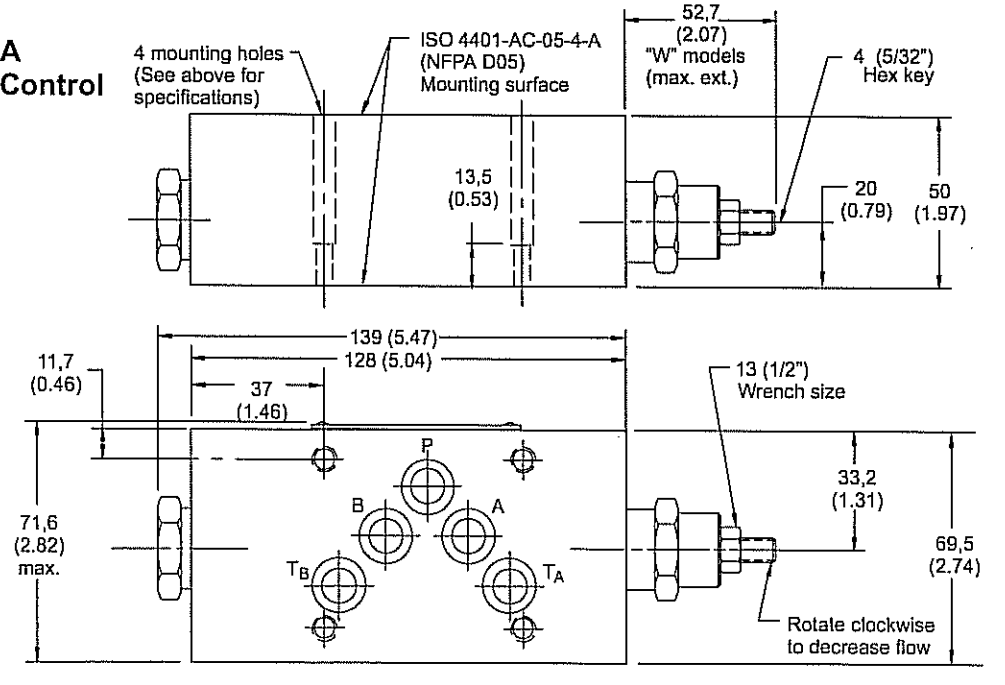


Model	A	B
DGMFN-5-X-P	60,4 (2.38)	28,4 (1.12)
DGMFN-5-Y-A	52,7 (2.07)	33,2 (1.31)

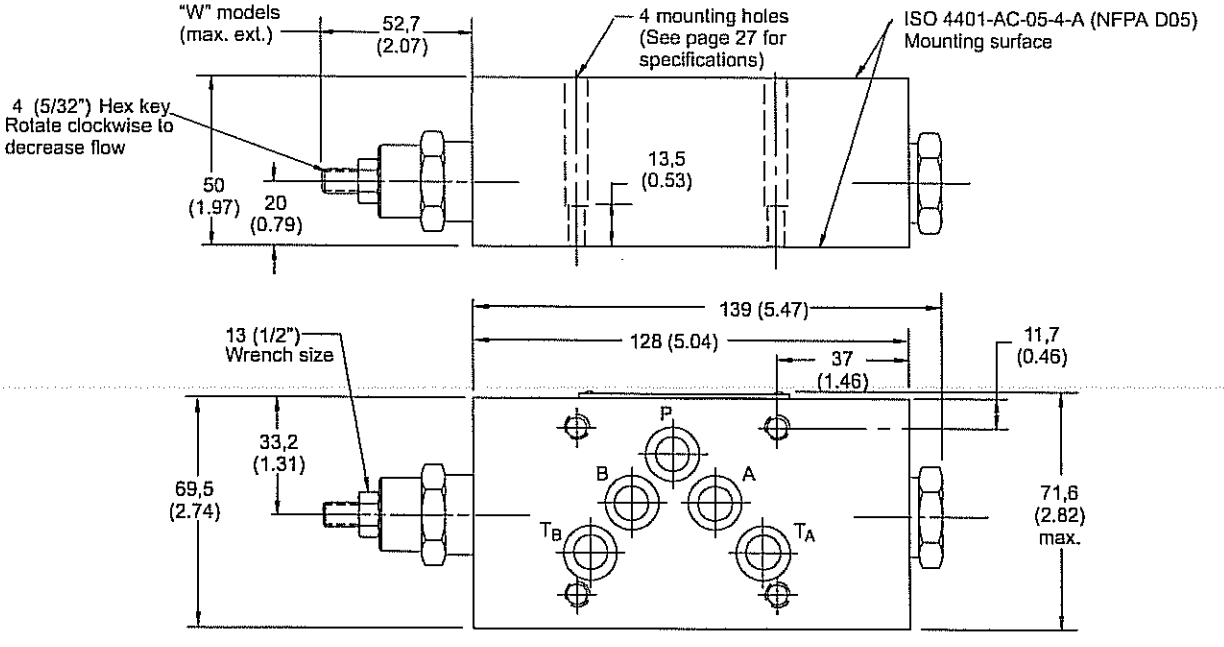
See page 37 for optional adjustment devices.
See page 38 for interface dimensions.

DGMFN-5-X-A
Single Flow Control

mm (inches)

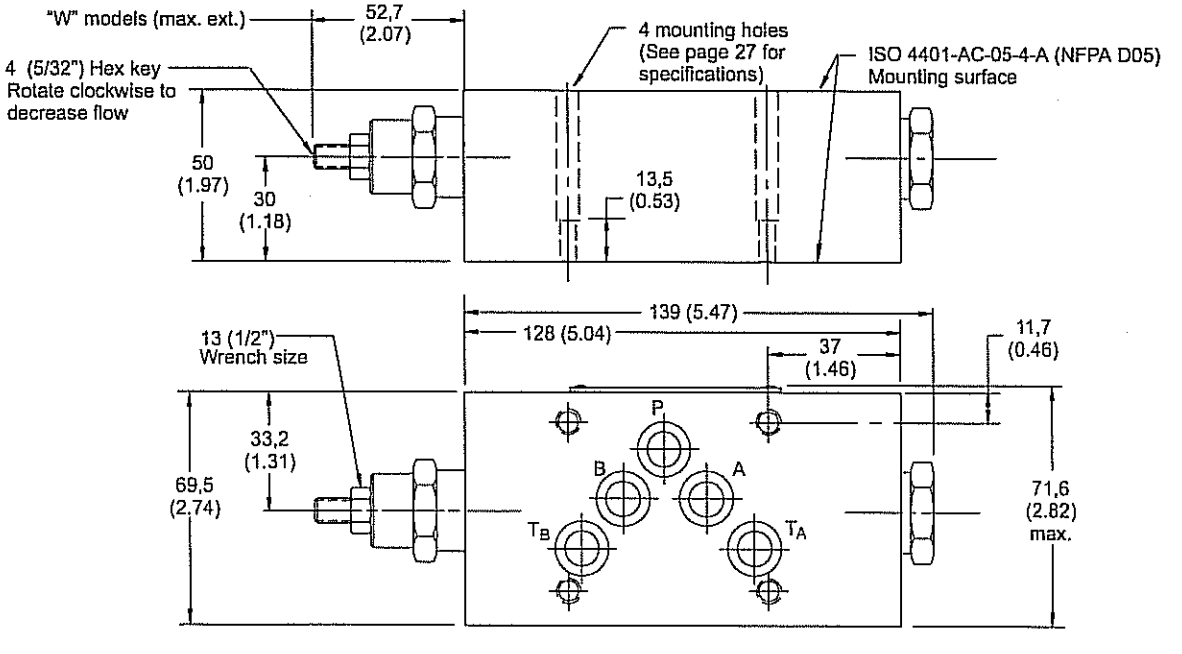


DGMFN-5-X-B
Single Flow Control
mm (inches)



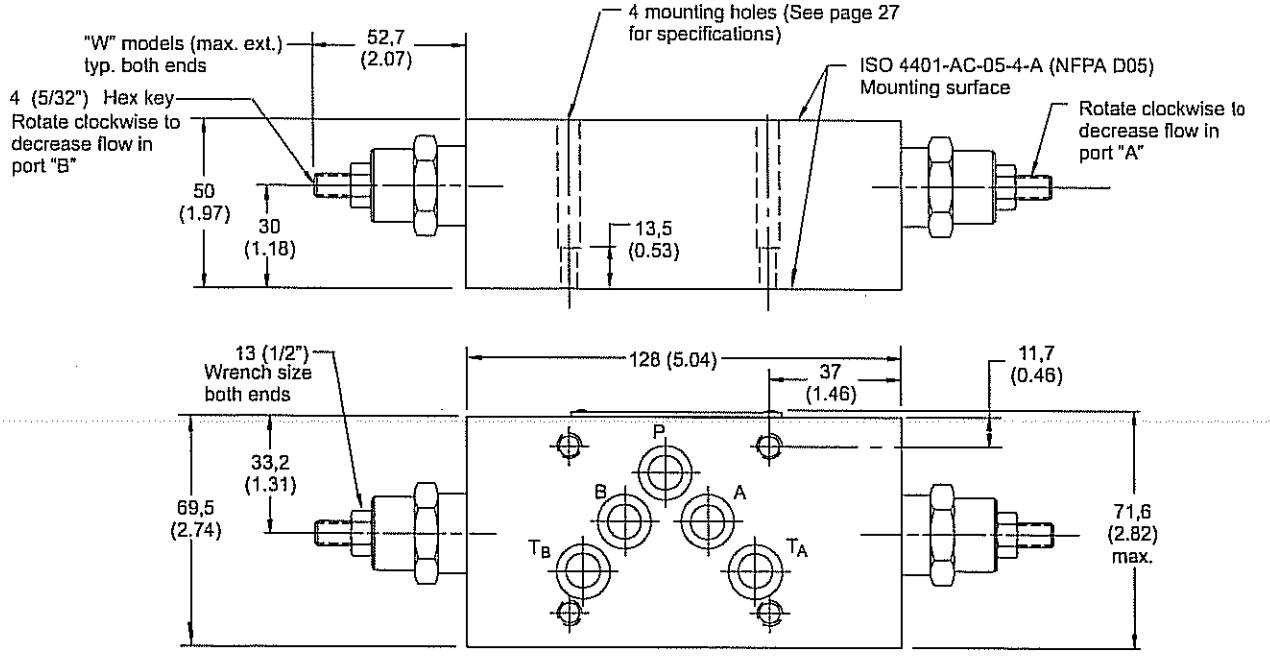
See page 37 for optional adjustment devices.
See page 38 for interface dimensions.

DGMFN-5-Y-B
Single Flow Control



DGMFN-5-Y Dual Flow Control

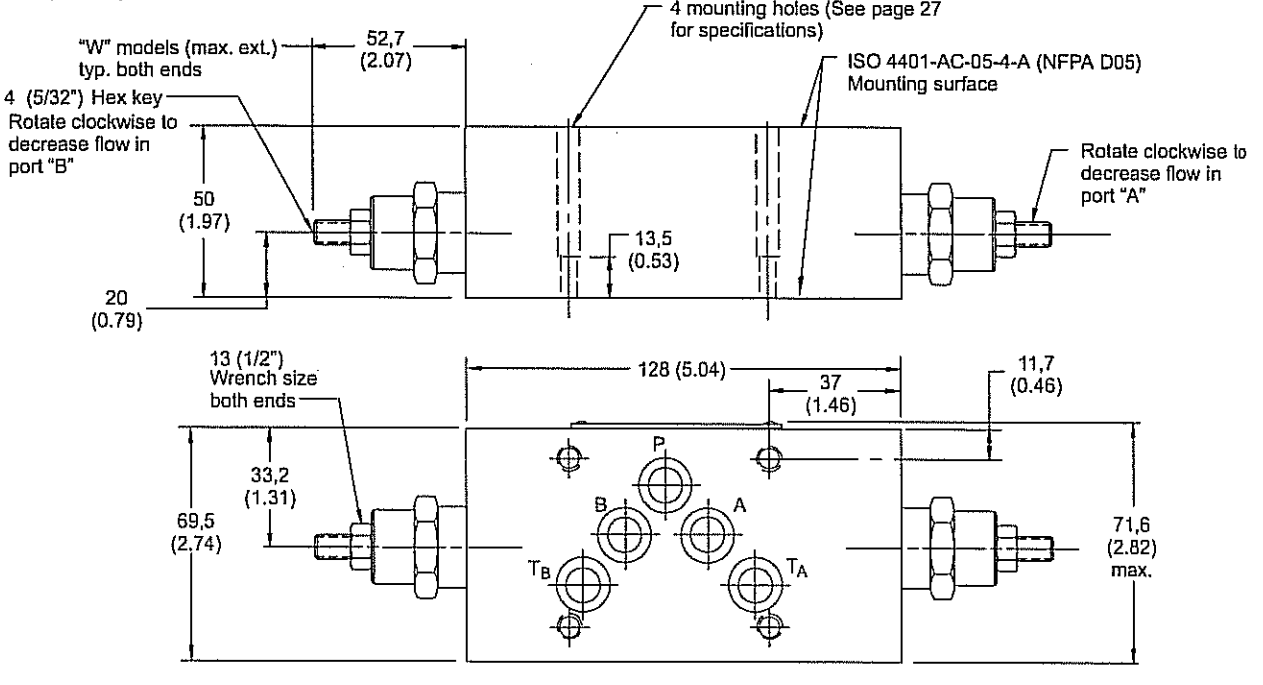
mm (inches)



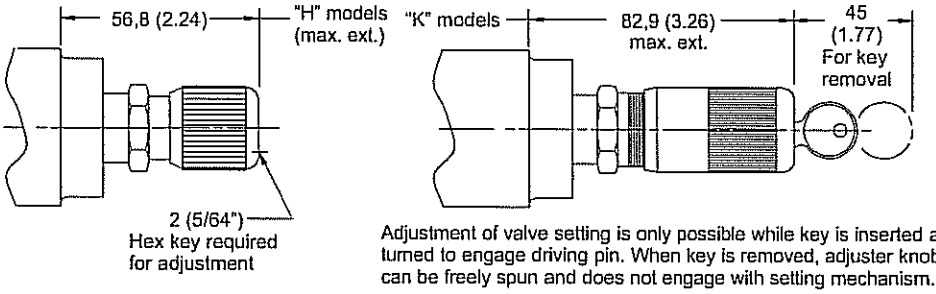
See page 37 for optional adjustment devices.
See page 38 for interface dimensions.

DGMFN-5-X Dual Flow Control

mm (inches)

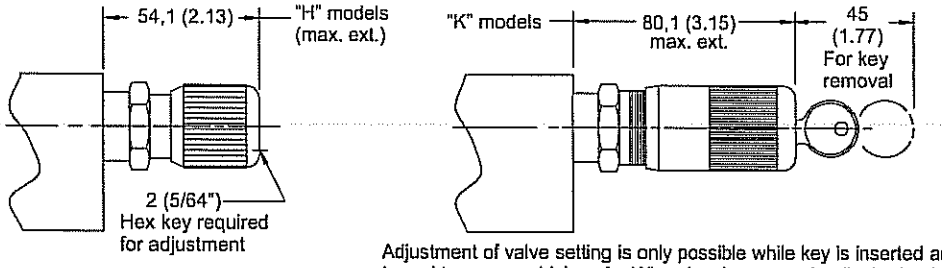


DGMC
DGMC2 (dual type)
DGMR1
DGMX2



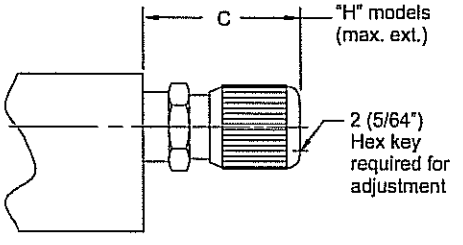
Adjustment of valve setting is only possible while key is inserted and turned to engage driving pin. When key is removed, adjuster knob can be freely spun and does not engage with setting mechanism.

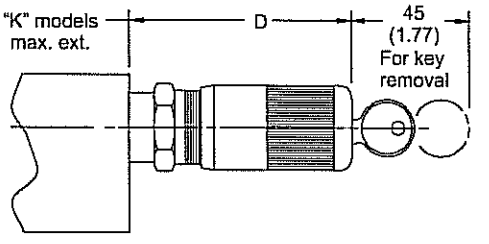
DGMC2
(crossport type)



Adjustment of valve setting is only possible while key is inserted and turned to engage driving pin. When key is removed, adjuster knob can be freely spun and does not engage with setting mechanism.

DGMFN



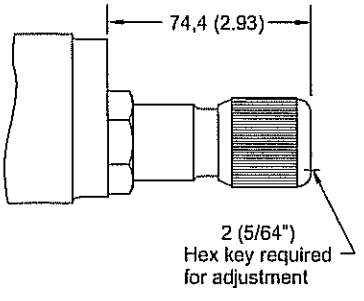


Model	C	D
DGMFN-5-X-P	68,9 (2.37)	95 (3.74)
DGMFN-5-Y-A	61,9 (2.44)	88 (3.46)

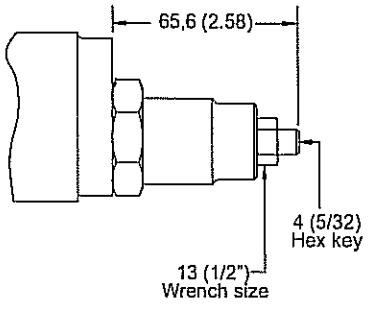
Adjustment of valve setting is only possible while key is inserted and turned to engage driving pin. When key is removed, adjuster knob can be freely spun and does not engage with setting mechanism.

DGMR

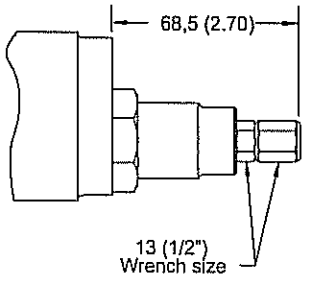
H – Handknob



W – Screw with locknut



C – Cap over screw

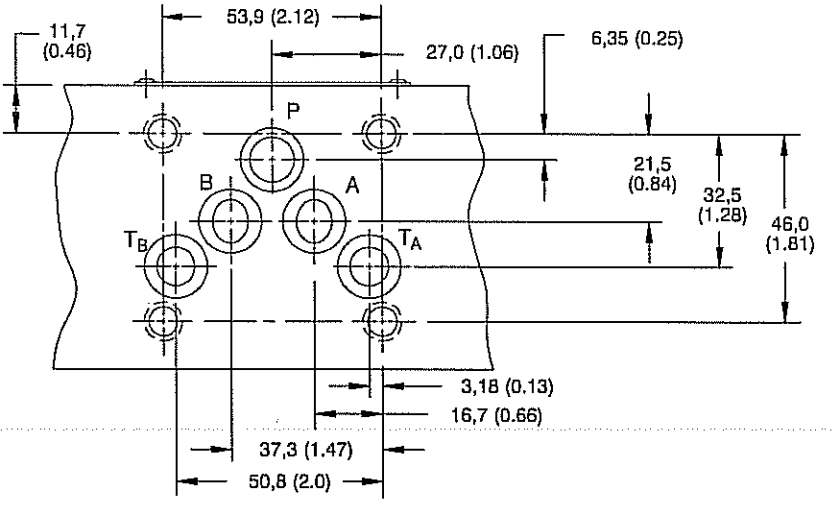


Mounting Surface

Dimensions mm (inches)

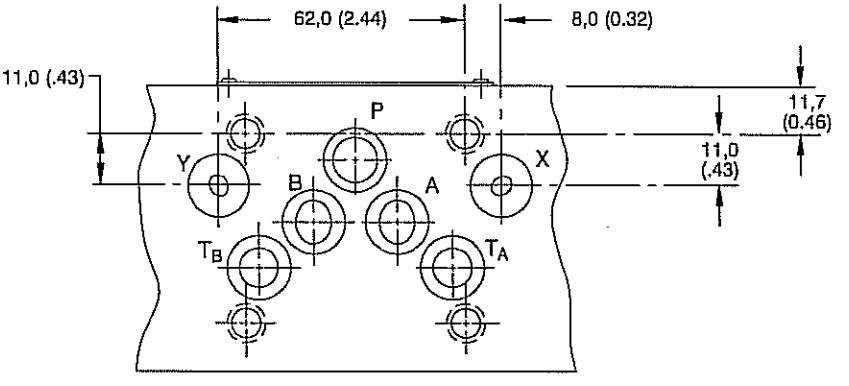
DGM**-5

The "5" interface accepts Vickers DG4S4 directional valves and other directional valves with a standard ISO 4401-05, NFPA-D05, ANSI/B93.7M size D05 or CETOP-5 port pattern.



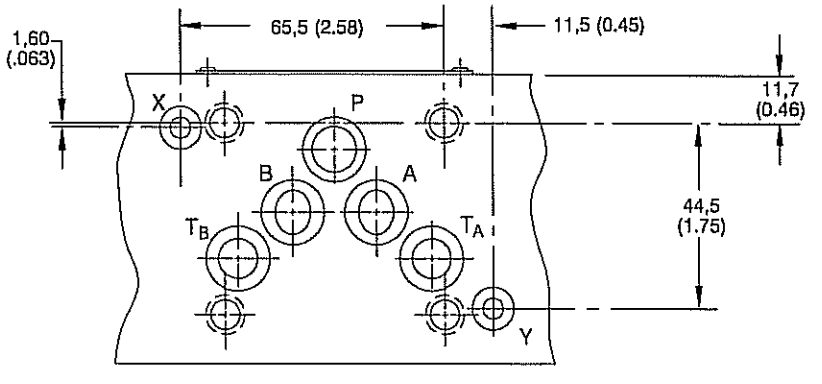
DGM**-5N

The "5N" NFPA-D05 interface accepts Vickers DG3S-5, DG5S-5, DG5V-5 and DG18S4-01 directional valves.



DGM**-5P

The "5P" NFPA-D05 interface accepts Vickers DG5S4-02 directional valves.



Bolt Extender Kits

ISO 4401-05 SystemStak valves may be mounted with either standard cap screws or bolt extender kits.

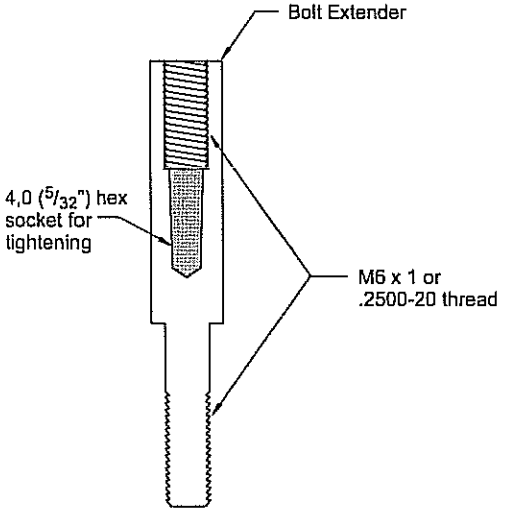
Metric cap screws must be of Class 12,9 (ISO 898) strength, minimum U.T.S. = 1200 MPa.

Inch threaded screws must conform to ANSI B18.3.

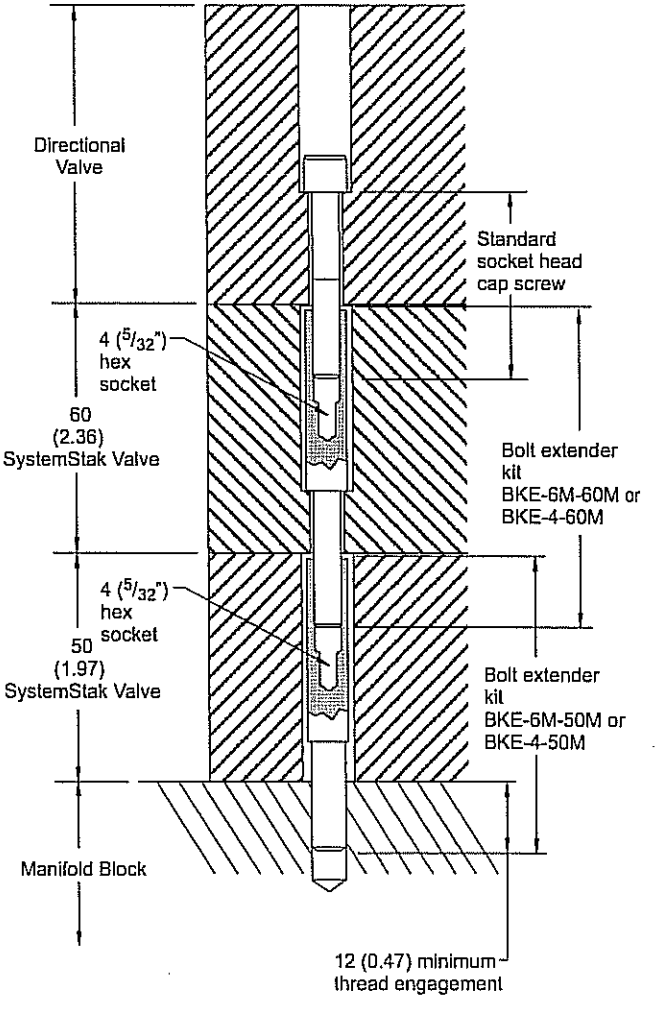
The use of Vickers bolt extenders simplifies installation by permitting each valve body to be separately installed with the correct torque value. A major advantage of bolt extenders is the ability to remove the directional valve for service or replacement without disturbing the stack assembly. *There are 4 bolt extenders per kit.*

SystemStak Valve Height mm (inch)	Metric		Inch		Extender Torque
	Thread	Kit Model Number	Thread	Kit Model Number	
50 (1.97)	M6 x 1-6H	BKE-6M-50M	.2500-20 UNC	BKE-4-50M	11,3-14,7 Nm (100-130 lbf in)
60 (2.36)	M6 x 1-6H	BKE-6M-60M	.2500-20 UNC	BKE-4-60M	

Bolt extender cross section



Example of bolt extenders on a typical SystemStak assembly

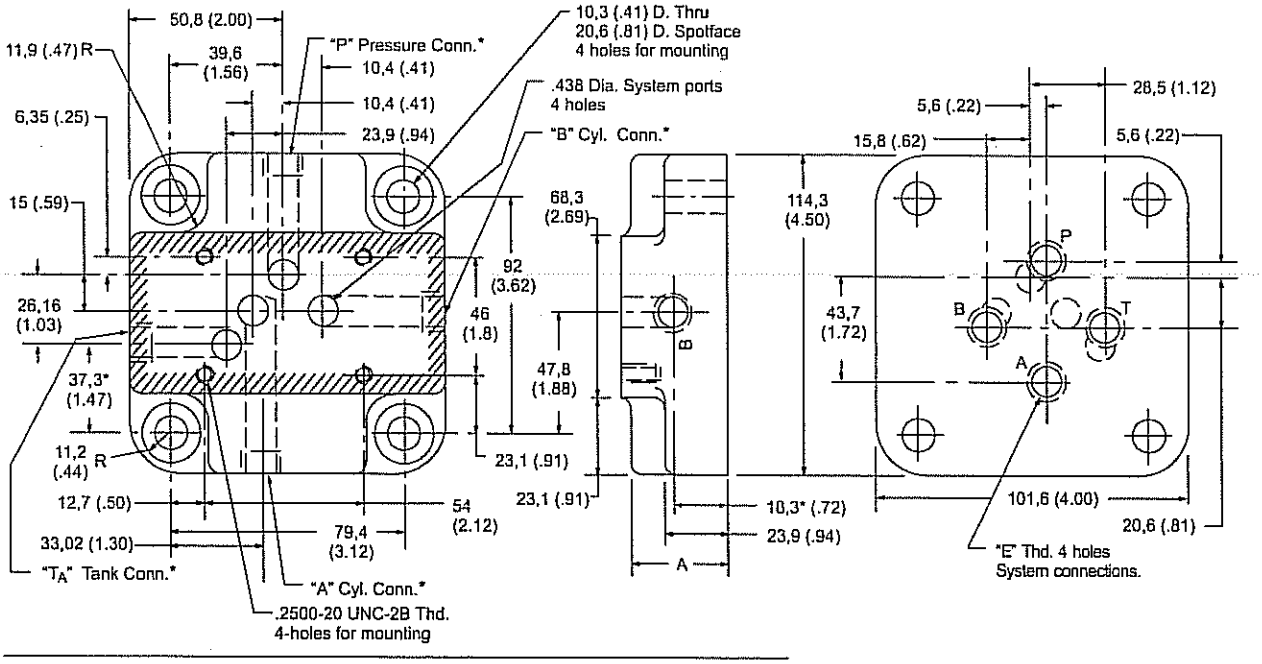


Subplates & Blanking Plate

Valves, subplates and blanking plates must be ordered separately.

DGSM(E) Subplate
(rated at 210 bar (3000 psi))

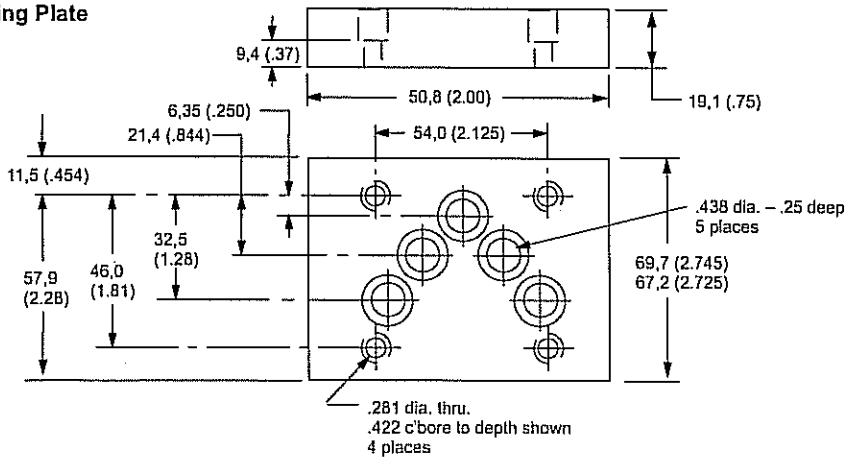
Millimeters (inches)



Model Numbers	"E" Thread	Tube Size	Dimension "A"
DGSM-01-20-T8	.750-16 UNF-2B	1/2" O.D.	31,75 (1.25)
DGSME-01-20-T8	.750-16 UNF-2B	1/2" O.D.	38,10 (1.50)

* Ports on side-connection Model DGSME-01-20-T8 only.

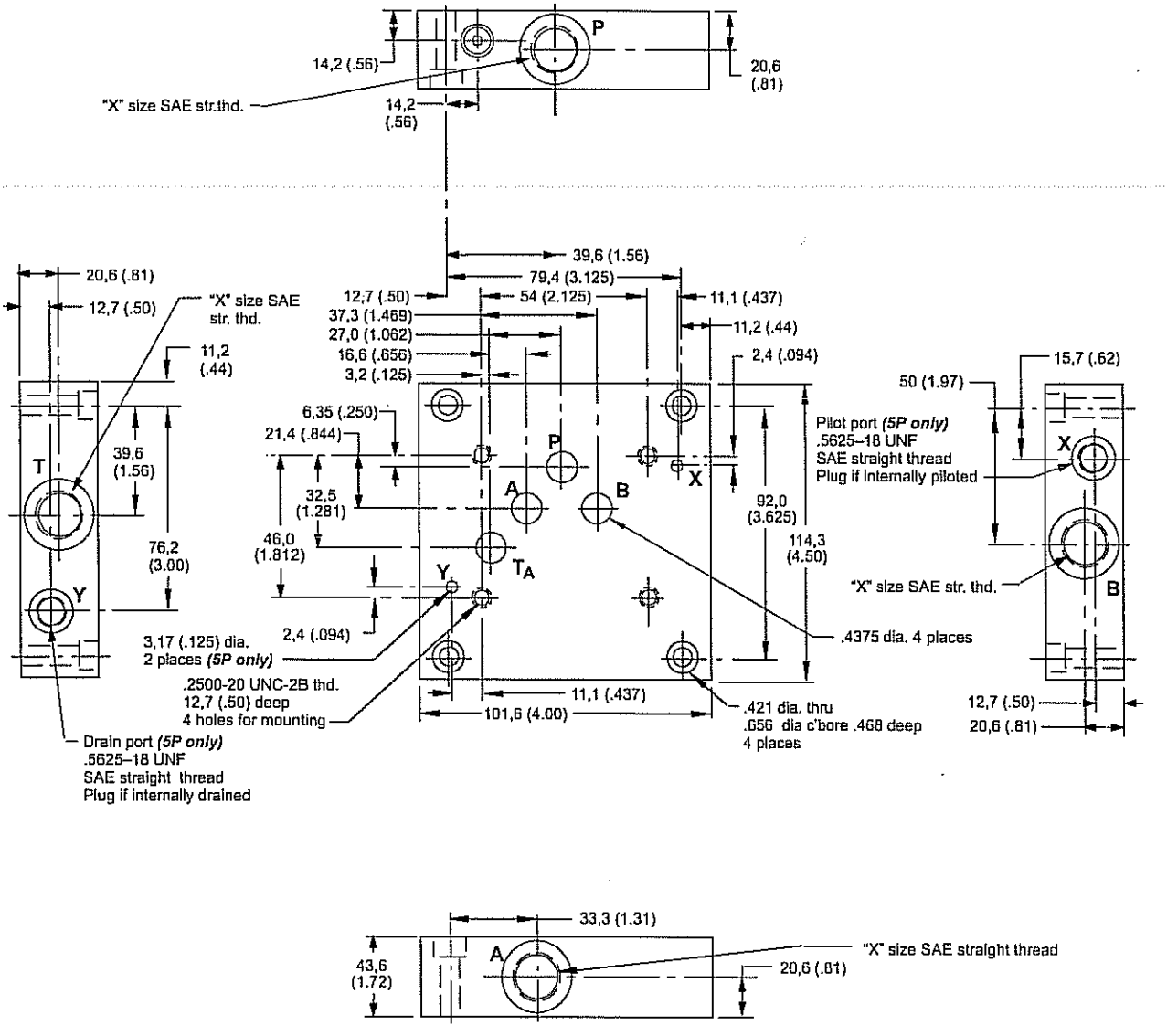
DGMAB-5-30 Blanking Plate



DGVME Side Ported Subplates
(rated at 315 bar (4500 psi))
"5" and "5P" interface

Model	"X"	Assembly
DGVME-5-SP-10-T06	.5625	525815
DGVME-5-SP-10-T08	.7500	525816
DGVME-5-SP-10-T10	.8750	525817
DGVME-5-SP-10-T12	1.0625	525818
DGVME-5-SP-PD-10-T10†	.8750	526003
DGVME-5-SP-PD-10-T12†	1.0625	526004

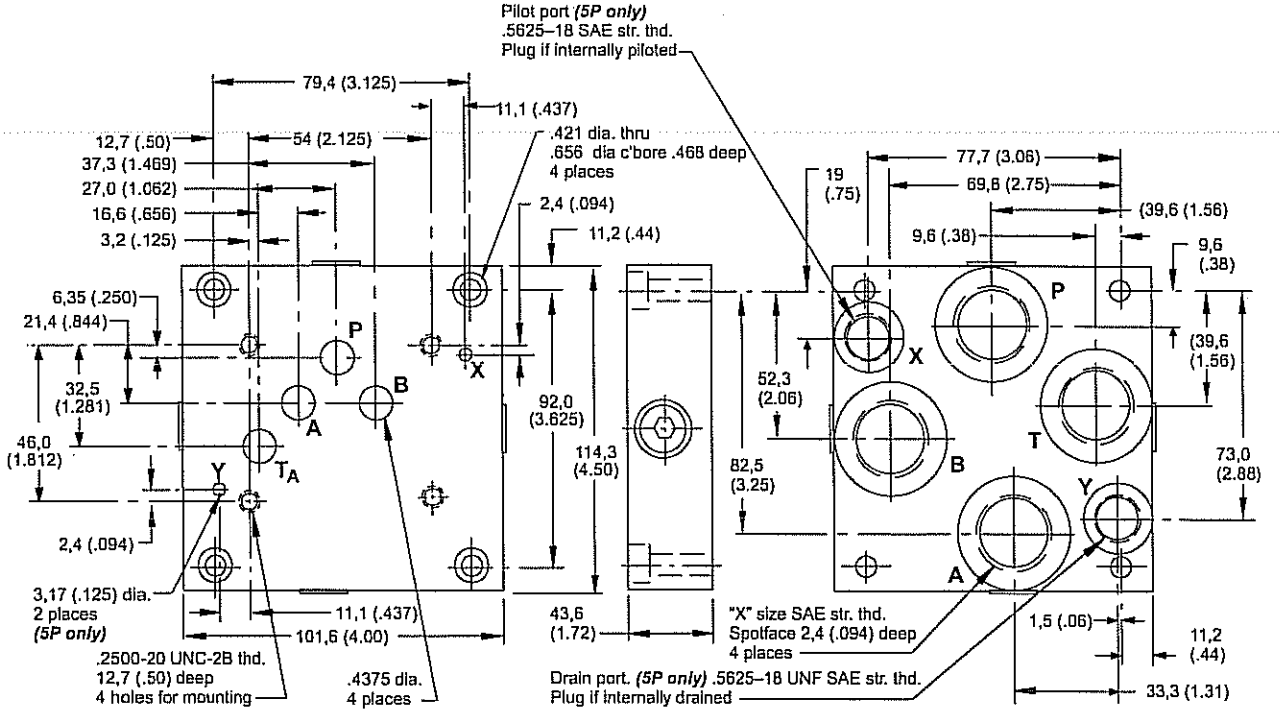
†Model with pilot and drain ports.



DGVM Bottom Ported Subplates
(rated at 315 bar (4500 psi))
"5" and "5P" interface

Model	"X"	Assembly
DGVM-5-SP-10-T06	.5625	525811
DGVM-5-SP-10-T08	.7500	525812
DGVM-5-SP-10-T10	.8750	525813
DGVM-5-SP-10-T12	1.0625	525814
DGVM-5-SP-PD-10-T10†	.8750	525832
DGVM-5-SP-PD-10-T12†	1.0625	525833

†Model with pilot and drain ports.



Application Data

Fluid Cleanliness

Proper fluid condition is essential for long and satisfactory life of hydraulic components and systems. Hydraulic fluid must have the correct balance of cleanliness, materials, and additives for protection against wear of components, elevated viscosity, and inclusion of air.

Essential information on the correct methods for treating hydraulic fluid is included in Vickers publication 561 "Vickers Guide to Systemic Contamination Control" available from your local Vickers distributor or by contacting Vickers, Incorporated. Recommendations on filtration and the selection of products to control fluid condition are included in 561.

Recommended cleanliness levels, using petroleum oil under common conditions, are based on the highest fluid pressure levels in the system and are coded in the chart below. Fluids other than petroleum, severe service cycles, or temperature extremes are cause for adjustment of these cleanliness codes. See Vickers publication 561 for exact details.

Vickers products, as any components, will operate with apparent satisfaction in fluids with higher cleanliness codes than those described. Other manufacturers will often recommend levels above those specified. Experience has shown, however, that life of any hydraulic component is shortened in fluids with higher cleanliness codes than those listed below. These codes have been proven to provide a long, trouble-free service life for the products shown, regardless of the manufacturer.

	System Pressure Level bar (psi)		
Product	**<70 (<1000)**	**70-207 (1000-3000)**	**207+ (3000+)**
Directional Valves	20/18/15	20/18/15	19/17/14
Pressure/Flow Control Valves	19/17/14	19/17/14	19/17/14

Fluid Viscosity

16-51 cSt (575-250 SUS)

Fluids and Seals

Flurocarbon seals are standard and are suitable for use with phosphate ester type fluids or their blends, water glycol, water-in-oil emulsion fluids and petroleum oil.

Eaton Hydraulics
15151 Highway 5
Eden Prairie, MN 55344
Telephone: 612 937-7254
Fax: 612 937-7130
www.eatonhydraulics.com

46 New Lane, Havant
Hampshire PO9 2NB
England
Telephone: (44) 170-548-6451
Fax: (44) 170-548-7110

VESUVIUS SYSTEMS

CALIBRATED NOZZLE CHANGER

CUSTOMER FILE

MECHANICAL EQUIPMENT	1	
	2	
	3	
	4	
	5	
HYDRAULIC EQUIPMENT	6	
	7	
	8	
	9	
TOOLS	10	TOOLS
INSTRUCTIONS	11	
REFRACTORIES	12	
PURCHASE	13	
	14	
AUTOMATION	15	
	16	

KLÜBER LUBRICATION BENELUX S.A.
Rue Cardinal Mercier, 100 B-7711 DOTTIGNIES
☎ CENTRAL : 056 / 48 33 11
☎ COMMERCIAL : 056 / 48 33 33
FAX : 056 / 48 62 52
E-mail : kluber@be.kluber.com
E-mail commercial : sales@be.kluber.com
URL : http://www.kluber.com

KLÜBER QUALITY
ISO 9000 EN 29000
Internationally certified and validated in acc.with EC Eco Audit Directive

NOTE D'ENVOI VERZENDINGSNOTA DELIVERY NOTE LIEFERSCHEIN	No./Nr.	DATE/DATUM
	29386	30.08.2001

KLÜBER LUBRICATION

Page: 1

LIVRAISON/LEVERING/DELIVERY/LIEFERUNG

VESUVIUS GROUP SA

RUE DE DOUVRAIN 17

7011 GHLIN

VOTRE ORDRE/UW BESTELLING/YOUR ORDER/IHRE BESTELLUNG

Cde GH 013674-0 dd 29.08.2001

9B68760

NOTRE ORDRE/ONZE BESTELLING/OUR ORDER/UNSERE BESTELLUNG

183970 du 29.08.2001

9A37198

Sac 4

EMBALLAGE VERPAKKING PACKAGE VERPACKUNG	ARTICLE ARTIKEL ARTICLE ARTIKEL	DESIGNATION MARCHANDISES WARENBESCHRIJVING DESCRIPTION OF GOODS WARENBEZEICHNUNG	BRUT BRUTO GROSSW BRUTTO	NET NETTO NET NETTO	QUANTITE HOEVEELHEID QUANTITY MENGE	Unité Eenh. Unit Einh.
6 Boîte(s) de 1,2 kg N° Charge(s) : 555267 Date libération : 15.06.2001 emballage standard 6 x 1,2 kg	099113	WOLFRACOAT C	8,5	7,2	7,200	K

L'acceptation de nos livraisons implique la vérification des quantités livrées. Toute réclamation doit être formulée à la réception ou nous parvenir endéans les trois jours.
Het aanvaarden van onze leveringen bevestigt het nazicht der geleverde hoeveelheden. Alle klachten moeten geschieden bij levering of ons toekomen binnen de drie dagen.
Die Annahme unserer Lieferungen bedingt eine Kontrolle der ausgelieferten Mengen. Reklamationen sind bei Empfang vorzubringen oder uns zukommen innerhalb von drei Tagen.
Acceptance of delivery implies that the goods have been checked. All claims must be made at the time of delivery or reach us within three days.

Le transporteur reconnaît avoir pris les marchandises en charge dans un parfait état de conditionnement.
De transporteur erkent de goederen in een perfekte staat van verpakking aangenomen te hebben.
Der Spediteur bestätigt die Güter in einwandfreier Beschaffenheit übernommen zu haben.
The carrier admits he has taken over the goods in perfect packaging.

Signature
Handtekening
Unterschrift
Signature

Total : 1 Colis

Nous certifions que les marchandises citées ci-dessus sont de qualité impeccable et répondent aux spécifications de nos usines.

MODE D'EXPEDITION
VERZENDINGSWIJZE
METHOD OF DESPATCH
VERSANDART
Par ABX

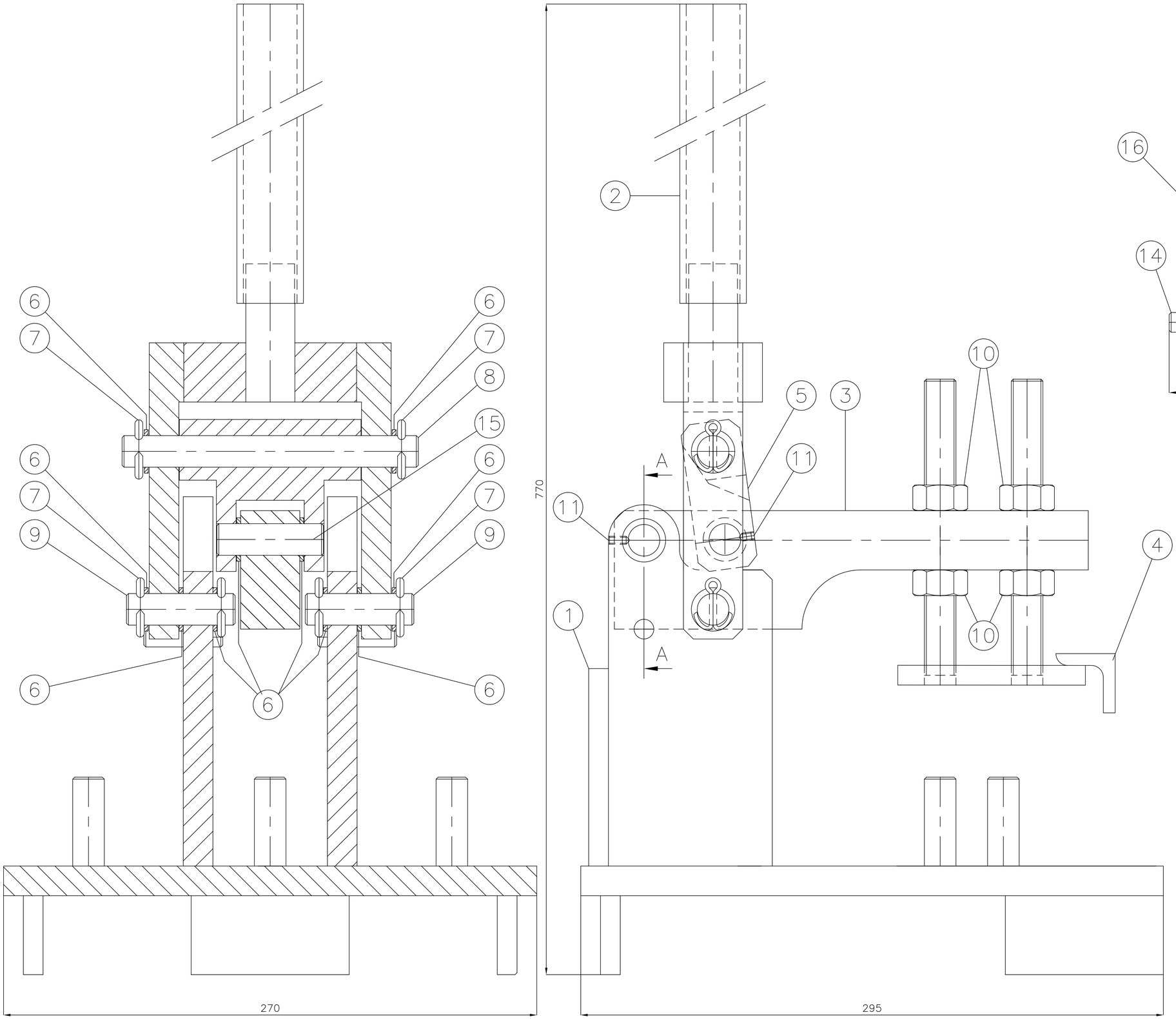
REMARQUES
OPMERKINGEN
OBSERVATIONS
BEMERKUNGEN

SUPPLIER NAME : KLUBER KLUBER LUBRIFICATION BELGE

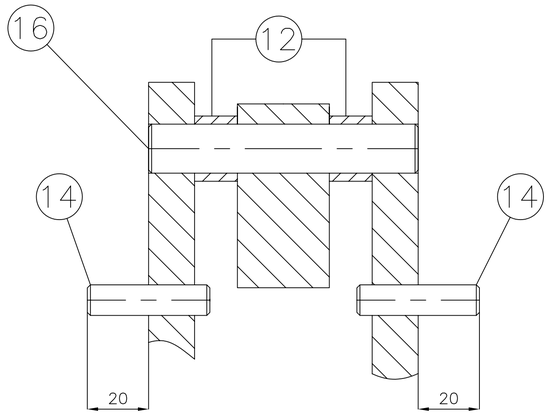
SUPPLIER REF : WOLFRACOAT-C

MANUFACTURER : KLUBER
CATALOG : NAME :
YEAR :
PAGE :
MANUFACT. REF : 099113
GROUPE : ME
FAMILY : OTH
MESURING UNIT : PC

VESUVIUS SYSTEMS	Drawn	Date	BY
		31/08/01	ROS
TITLE	MOD.	NUMBER	
GREASE WOLFRACOAT C-1.200KG		9B68760	



SECTION A–A



	ITEM	DESIGNATION	NUMBER	QTY.	MATERIAL Name	MATERIAL Number	WEIGHT
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	15	AXLE	9A54755	1			
	14	PIN DIN1481 DIA10x40	0004769	2			
①	–						
	12	SPACER	9A55042	2			
	11	SCREW DIN914 M04x8	1806900	4			
	10	NUT DIN934 M16	0765600	4			
	9	AXLE	9A54748	2			
	8	AXLE	9A54730	1			
	7	PIN DIN94 DIA4x28	1948600	6			
	6	WASHER DIN988 DIA16x22x2	9A54771	10			
①	5	PIVOT ARM	9A54722	1			
①	4	TABLE	9A54714	1			
①	3	LEVER	9A54706	1			
①	2	HANDLE	9A54698	1			
①	1	PREPARATION TABLE	9A54672	1			

UNLESS OTHERWISE SPECIFIED	Nominal dim. Above mm:	Nominal dim. until mm:	Linear tol. mm:
	–	6	±0.2
	6	30	±0.5
	30	120	±0.8
	120	315	±1.2
	315	1000	±2.0
	1000	2000	±3.0
	2000	4000	±4.0

Angular tol : Undimensioned radii : All sharp corners to be chamfered.

	DATE	BY
DRAWN	10/02/99	AY
CHECKED		
APPROVED FOR MANUFACTURING	19/02/99	CAL
PROJECT Nr	MACHINING	

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SCALE: 1/1

16/03/99	DATE
AY	DRAWN
JLR	CHECKED
①	VERSION

TITLE	MOD.	NUMBER	VERS.
PREPARATION TABLE ASSY	CNC	9A54664	1

VESUVIUS GROUP S.A.
Rue de Douvrain, 17
B-7011 GHLIN
BELGIQUE

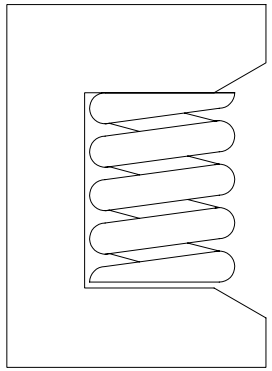
Vesuvius Systems Ghlin | Item's part List | BOM Level: Level 0

	9A54664	**9A54664**	**PREPARATION TABLE ASSY**				**A1**

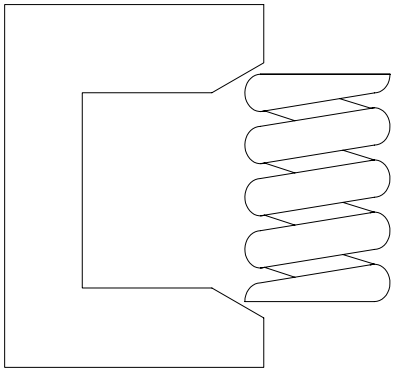
Level	Items	DWG Nbr	Type	Marker	Description	Quantity	Unit	Format
0	9A54672	9A54672 - 01	Item	1	PREPARATION TABLE	1,00	PC	A1
0	0765600	0765600 -	Item	10	NUT DIN934 M16	4,00	PC	A4
0	1806900	1806900 -	Item	11	SCREW DIN914 M04X08	4,00	PC	A4
0	9A55042	9A55042 - 00	Item	12	SPACER	2,00	PC	A3
0	0004769	0004769 -	Item	14	PIN DIN1481 DIA10X40	2,00	PC	A4
0	9A54755	9A54755 - 00	Item	15	AXLE	1,00	PC	A3
0	9A54763	9A54763 - 00	Item	16	AXLE	1,00	PC	A3
0	9A54698	9A54698 - 01	Item	2	HANDLE	1,00	PC	A1
0	9A54706	9A54706 - 01	Item	3	LEVER	1,00	PC	A2
0	9A54714	9A54714 - 02	Item	4	TABLE	1,00	PC	A2
0	9A54722	9A54722 - 01	Item	5	PIVOT ARM	1,00	PC	A2
0	9A54771	9A54771 -	Item	6	WASHER DIN988 DIA16X22X2	10,00	PC	A4
0	1948600	1948600 -	Item	7	PIN DIN94 DIA04X28	6,00	PC	A4
0	9A54730	9A54730 - 00	Item	8	AXLE	1,00	PC	A3
0	9A54748	9A54748 - 00	Item	9	AXLE	2,00	PC	A3

Perform the introduction of an old spring into the checking tool;
– If the spring get freely into the tool, scrap the old spring.
The old spring can not be re–use for the cast.
– If the spring can not get into the tool, keep the old spring.
The old spring can be re–use for the cast.

NOT OK



OK



ITEM	DESIGNATION	NUMBER	QTY.	Name / Number / MATERIAL	WEIGHT

UNLESS OTHERWISE SPECIFIED	Nominal dim. Above mm:	until mm:	Linear tol. mm:
	–	6	±0.2
	6	30	±0.5
	30	120	±0.8
	120	315	±1.2
	315	1000	±2.0
	1000	2000	±3.0
	2000	4000	±4.0

Angular tol : Undimensioned
radii : All sharp corners to be chamfered.

	DATE	BY
DRAWN	1/12/1997	AY
CHECKED		
APPROVED FOR MANUFACTURING	3/12/1997	LR
PROJECT Nr	MACHINING	

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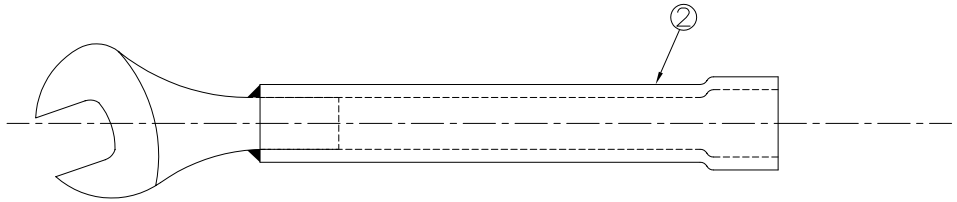
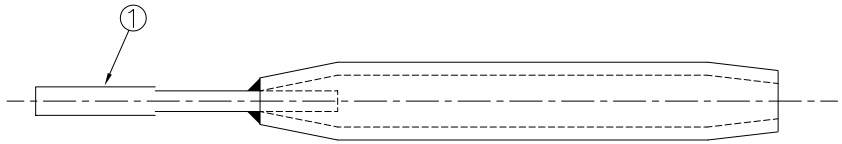
~ (3,2)

SCALE: 1 / 1

TRACABILITY PUR 34 – Markings must be easily readable – Mark Vesuvius logo + Supplier Initials ex. : (DD)	19/04/2005	24/09/2004	DATE
NOTE 1 DETAIL – Part number + Revision (BB) – PO + initial of TTF (CC) + Machining PO number (XXXXXX)	SMA	CCO	DRAWN
	CLD	SC	CHECKED
	⑤	4	VERSION

TITLE	MOD.	NUMBER	VERS.
CHECKING TOOL FOR SPRING	CNC	9A31431	05





ITEM	MOD.	DESIGNATION	NUMBER	Name	Number	Qty.	Assy.	Mach.
2		PIPE 30X5		St37				
1		12 POINT OFFSET COMBINATION 24MM WRENCH	9A00535					

MATERIAL | QUANTITY

UNLESS OTHERWISE SPECIFIED	Nominal dim. Above mm:	Nominal dim. until mm:	Linear tol. mm:
	–	6	±0.2
	6	30	±0.5
	30	120	±0.8
	120	315	±1.2
	315	1000	±2.0
	1000	2000	±3.0
	2000	4000	±4.0

Angular tol : Undimensioned
radii : All sharp corners to be chamfered.

	DATE	BY
DRAWN	08/10/96	MDR
CHECKED		
APPROVED FOR MANUFACTURING	08/10/96	FNR
PROJECT Nr	MACHINING	

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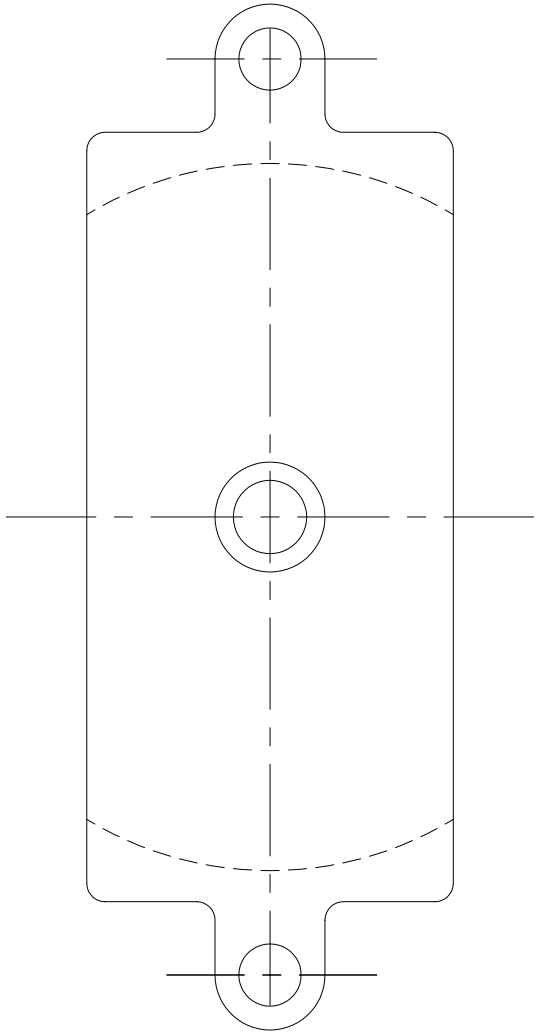
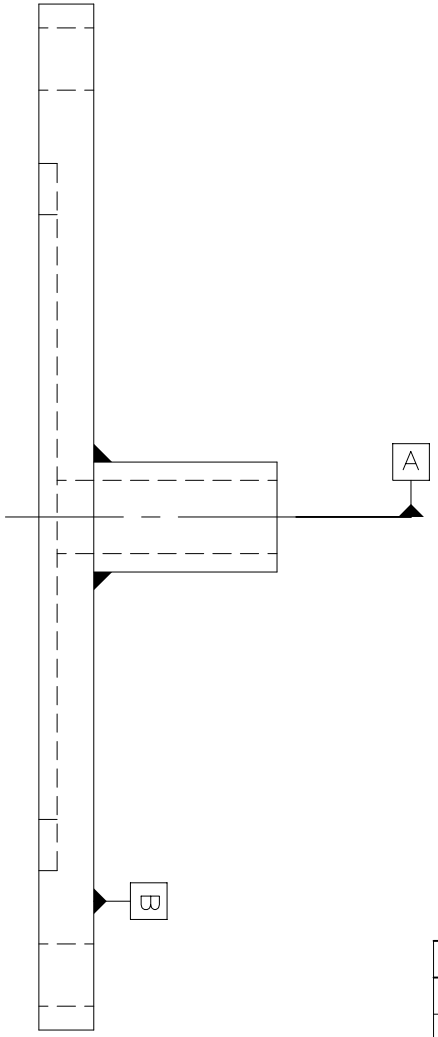
SCALE: 1/2

DATE					
QUANTITY					
ZONE					
VERSION	5	4	3	2	1

TITLE: GATE WRENCH

MOD.	NUMBER	VERS.
CNC	9A12993	00





NOTE: A AND B MUST BE PERPENDICULAR
TO 0.1/100 MM MAXIMUM

ITEM	MOD.	DESIGNATION	NUMBER

Nominal dim. Above mm:	until mm:	Linear tol. mm:
–	6	±0.2
6	30	±0.5
30	120	±0.8
120	315	±1.2
315	1000	±2.0
1000	2000	±3.0
2000	4000	±4.0

UNLESS OTHERWISE SPECIFIED

Angular tol : Undimensioned radii : All sharp corners to be chamfered.

Name	Number	Qty.	Assy.	Mach.
St 52-3				
MATERIAL			QUANTITY	

	DATE	BY
DRAWN	25/01/96	LGB
CHECKED		
APPROVED FOR MANUFACTURING	25/01/96	MDR
PROJECT Nr	MACHINING	

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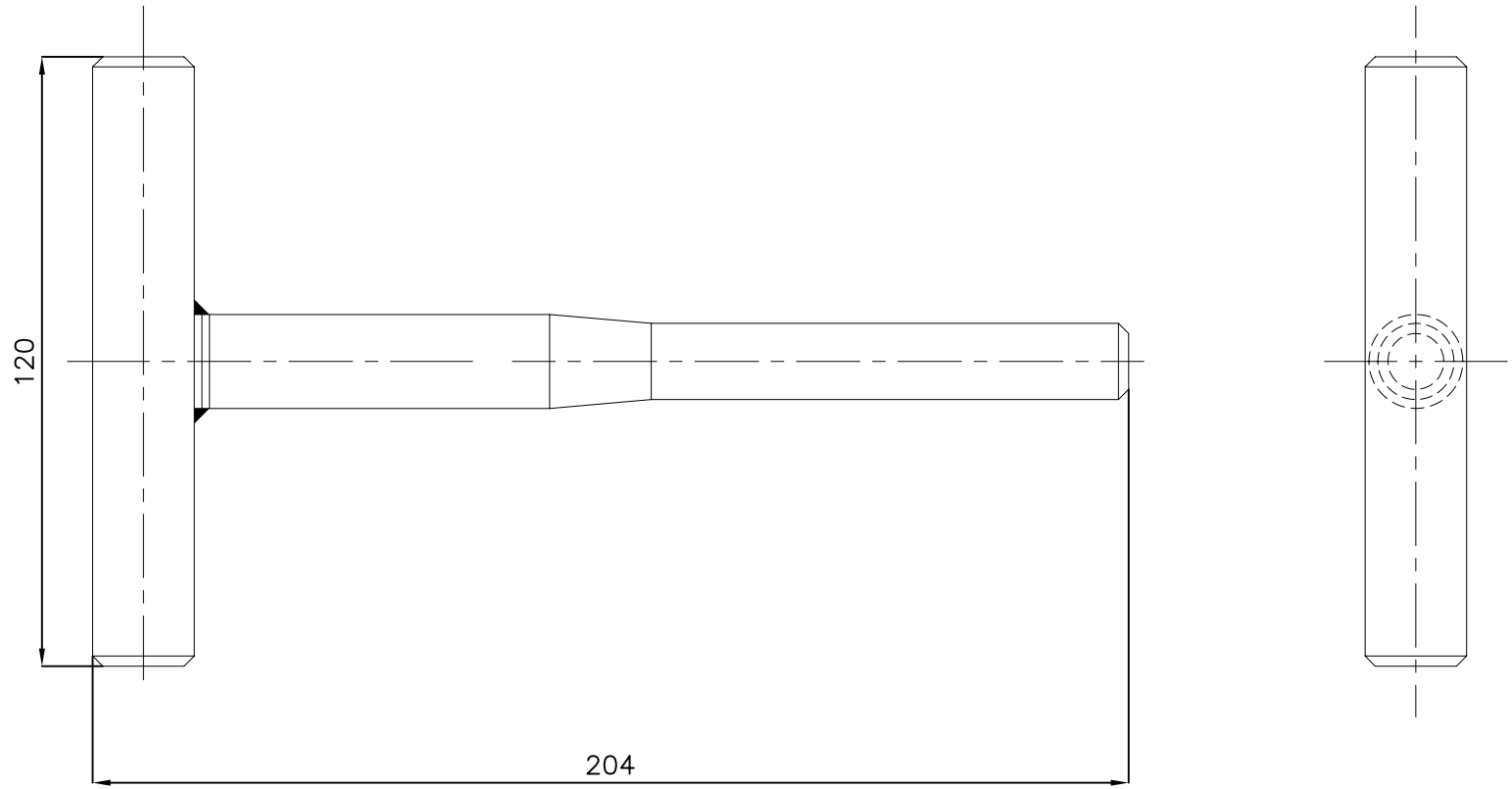
3,2 ▽ (~)

SCALE: 1/1

DATE					
QUANTITY					
ZONE					
VERSION	5	4	3	2	1

TITLE	MOD.	NUMBER	VERS.
CENTERING TOOL	CNC	0009688	00



ITEM	DESIGNATION	NUMBER	QTY.	Name / Number / MATERIAL	WEIGHT

UNLESS OTHERWISE SPECIFIED	Nominal dim. Above mm:	Nominal dim. until mm:	Linear tol. mm:
	–	6	±0.2
	6	30	±0.5
	30	120	±0.8
	120	315	±1.2
	315	1000	±2.0
	1000	2000	±3.0
	2000	4000	±4.0

Angular tol : Undimensioned
radii : All sharp corners to be chamfered.

	DATE	BY
DRAWN	15/12/2003	CCO
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APPROVED FOR MANUFACTURING	19/12/2003	LR
PROJECT Nr	MACHINING	

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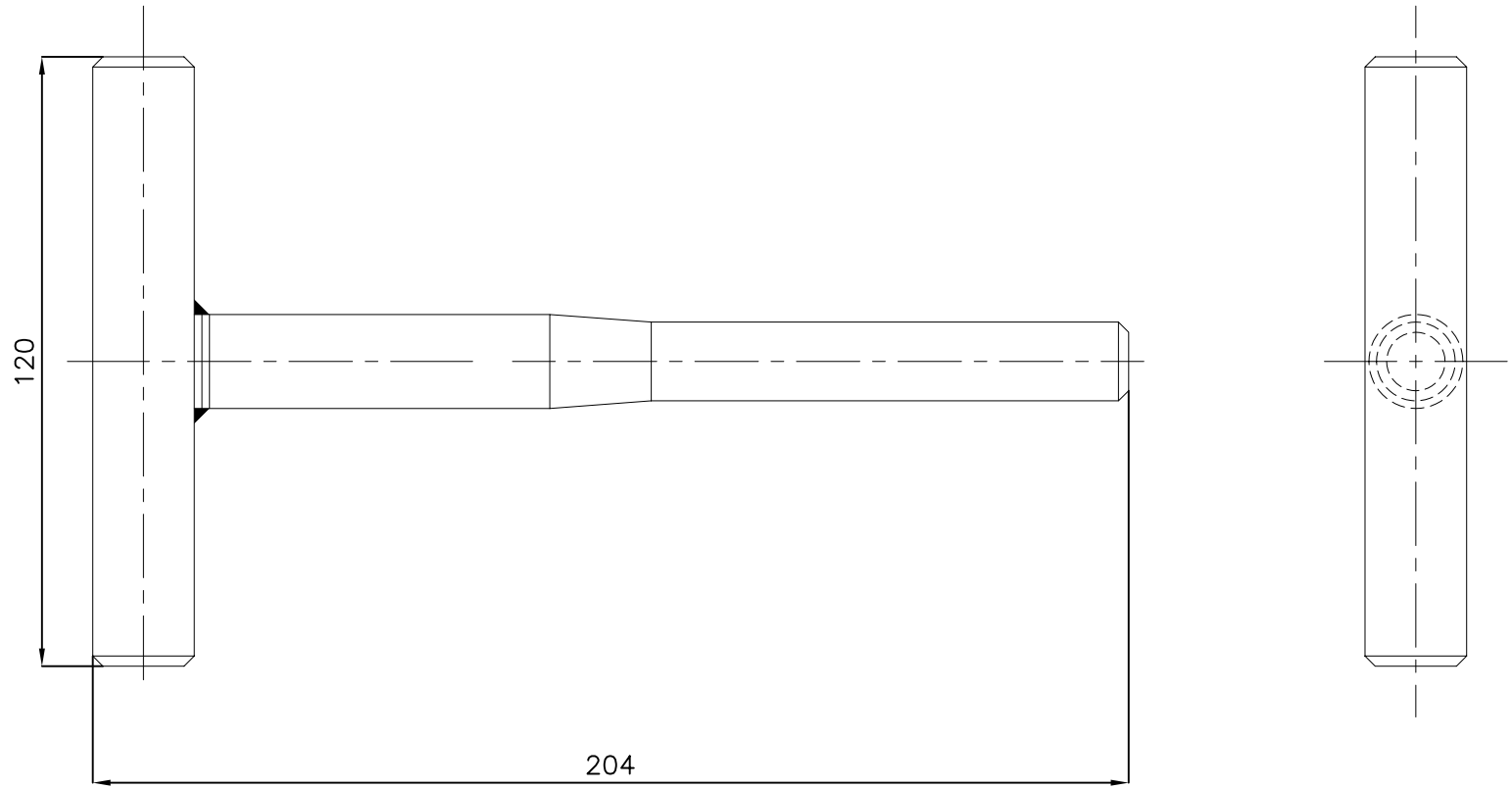
		DATE
		DRAWN
		CHECKED
		VERSION

TITLE	MOD.	NUMBER	VERS.
PLATE CENT. TOOL DIA18.5X15	CNC	9C26314	00



ITEM	DESIGNATION	NUMBER	QTY.	Name / Number / MATERIAL	WEIGHT

UNLESS OTHERWISE SPECIFIED	Nominal dim. Above mm:	Nominal dim. until mm:	Linear tol. mm:
	–	6	±0.2
	6	30	±0.5
	30	120	±0.8
	120	315	±1.2
	315	1000	±2.0
	1000	2000	±3.0
	2000	4000	±4.0

Angular tol : Undimensioned
radii : All sharp corners to be chamfered.

	DATE	BY
DRAWN	2/13/2003	CCO
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APPROVED FOR MANUFACTURING	14/02/03	LR
PROJECT Nr	MACHINING	

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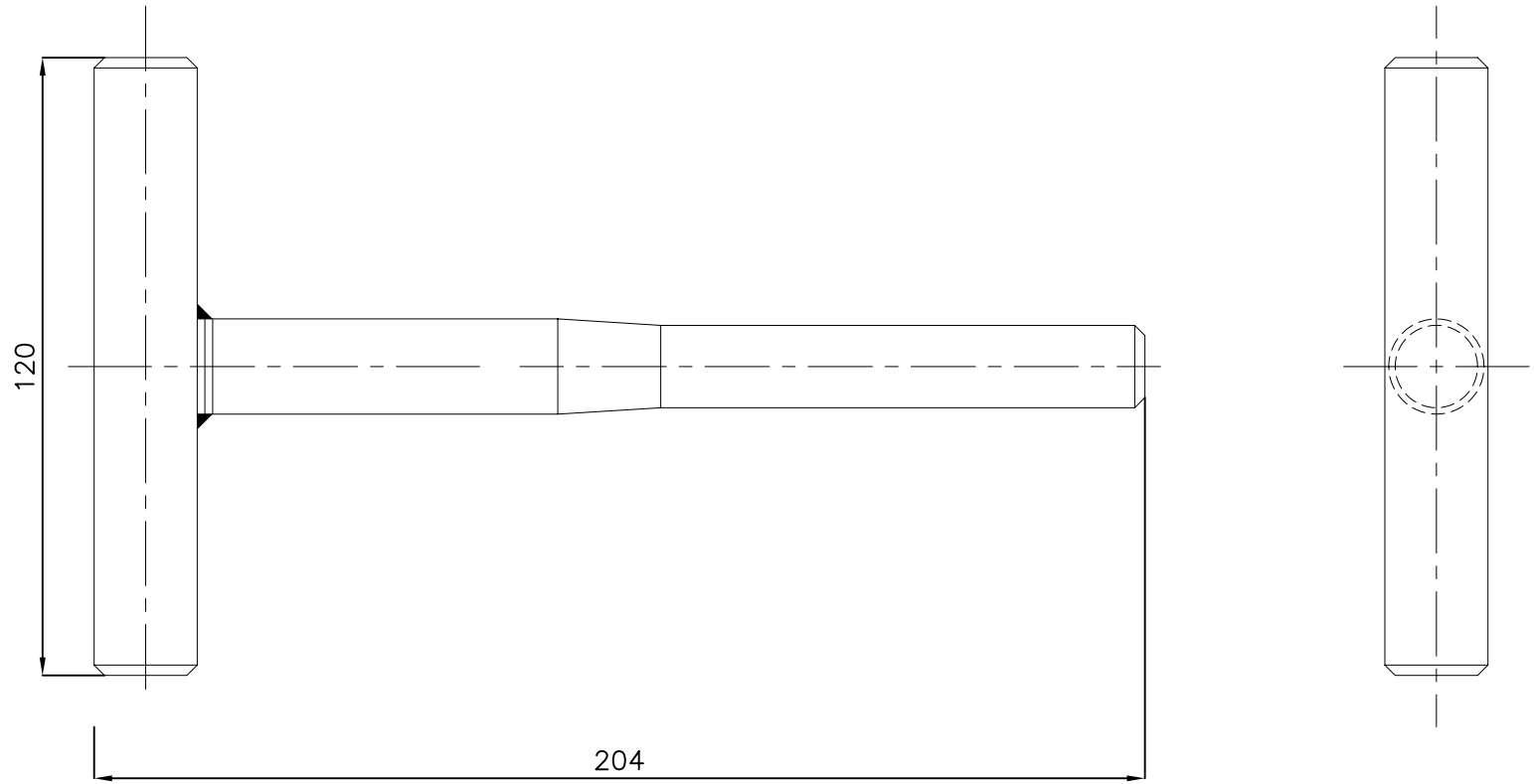
		DATE
		DRAWN
		CHECKED
		VERSION

TITLE	MOD.	NUMBER	VERS.
PLATE CENT. TOOL DIA18.5X15.5	CNC	9C04252	00



ITEM	MOD.	DESIGNATION	NUMBER

Name	Number	Qty.	Assy.	Mach.
MATERIAL			QUANTITY	

Nominal dim. Above mm:	until mm:	Linear tol. mm:
–	6	±0.2
6	30	±0.5
30	120	±0.8
120	315	±1.2
315	1000	±2.0
1000	2000	±3.0
2000	4000	±4.0

UNLESS OTHERWISE SPECIFIED

Angular tol : Undimensioned radii : All sharp corners to be chamfered.

	DATE	BY
DRAWN	30/10/96	LR
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APPROVED FOR MANUFACTURING	31/10/96	JLR
PROJECT Nr	MACHINING	

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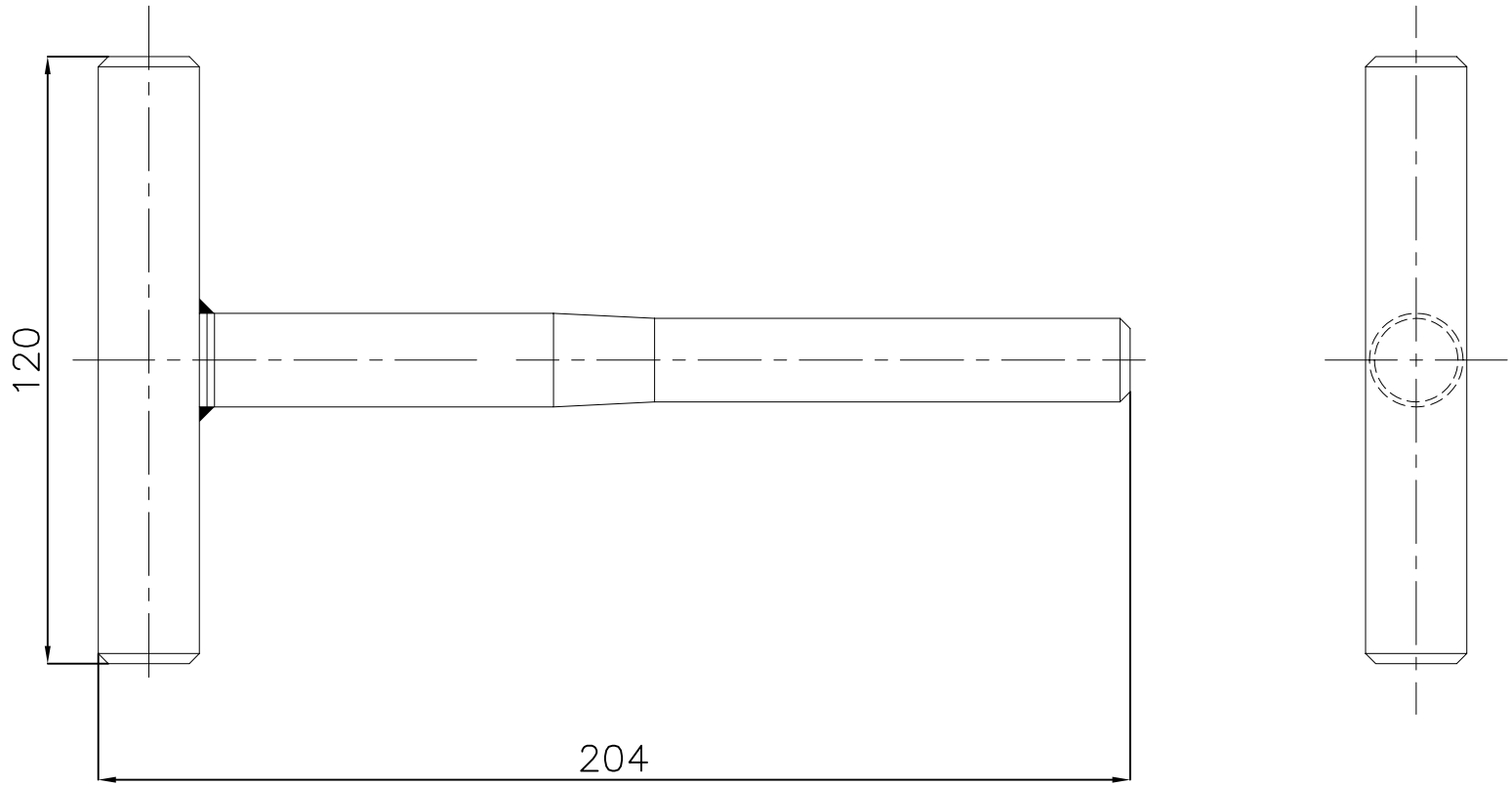
					DATE
					QUANTITY
					ZONE
5	4	3	2	1	VERSION

TITLE	MOD.	NUMBER	VERS.
PLATE CENTERING TOOL DIA18.5xDIA16	CNC	9A14387	00



ITEM	DESIGNATION	NUMBER	QTY.	Name / Number / MATERIAL	WEIGHT

UNLESS OTHERWISE SPECIFIED	Nominal dim. Above mm:	Nominal dim. until mm:	Linear tol. mm:
	–	6	±0.2
	6	30	±0.5
	30	120	±0.8
	120	315	±1.2
	315	1000	±2.0
	1000	2000	±3.0
	2000	4000	±4.0

Angular tol : Undimensioned
radii : All sharp corners to be chamfered.

	DATE	BY
DRAWN	07/01/00	LGB
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APPROVED FOR MANUFACTURING	07/01/00	CAL
PROJECT Nr	MACHINING	

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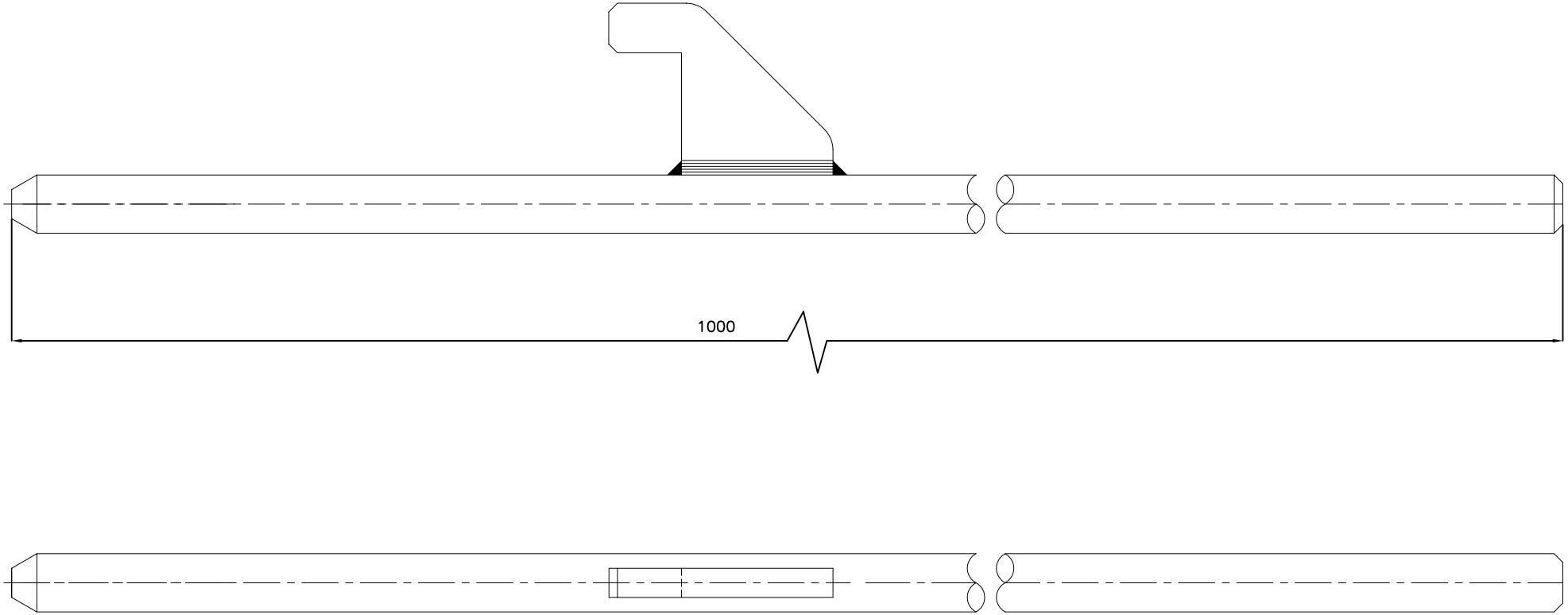
		DATE
		DRAWN
		CHECKED
		VERSION

TITLE	MOD.	NUMBER	VERS.
PLATE CENT. TOOL DIA18.5XDIA16.5	CNC	9B26660	00



ITEM	DESIGNATION	NUMBER	QTY.	MATERIAL	WEIGHT
				St52-3	

UNLESS OTHERWISE SPECIFIED	Nominal dim. Above mm:	until mm:	Linear tol. mm:
	–	6	±0.2
	6	30	±0.5
	30	120	±0.8
	120	315	±1.2
	315	1000	±2.0
	1000	2000	±3.0
	2000	4000	±4.0

Angular tol : Undimensioned
radii : All sharp corners to be chamfered.

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	DATE	BY
DRAWN	3/23/2000	LGB
CHECKED		
APPROVED FOR MANUFACTURING	4/10/1900	JLR
PROJECT Nr	MACHINING	
	~	
	SCALE: 1/1	

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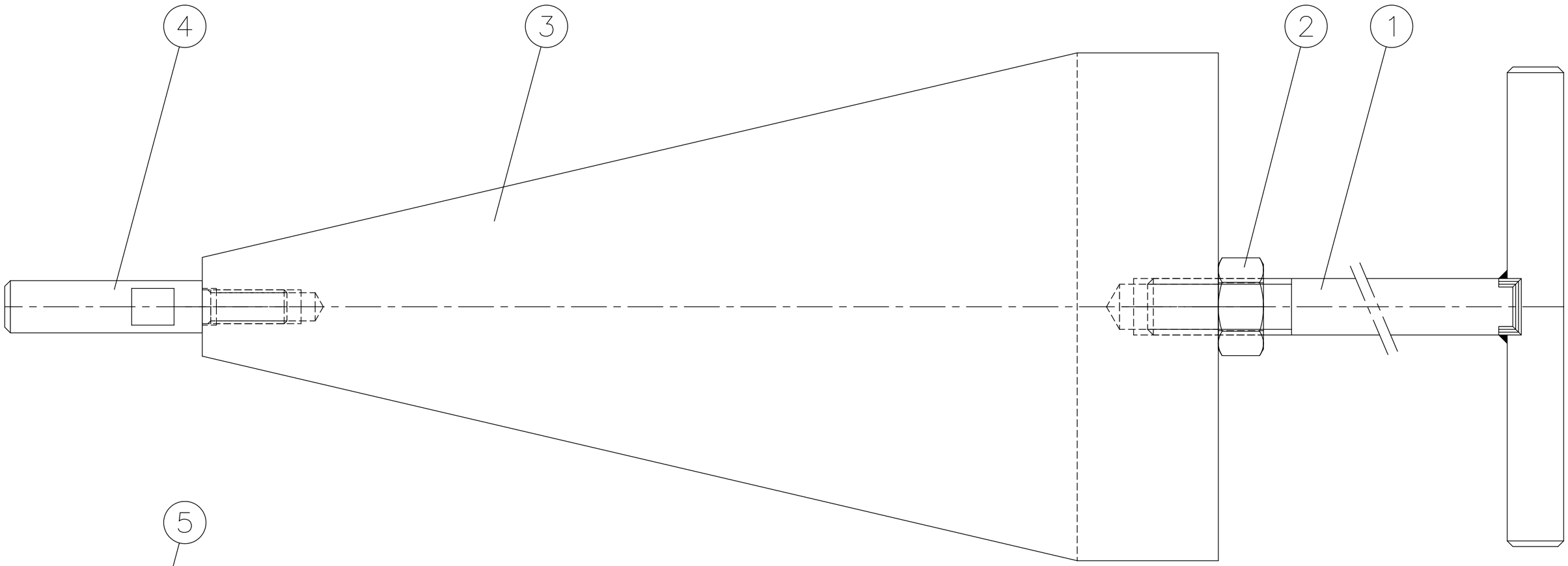
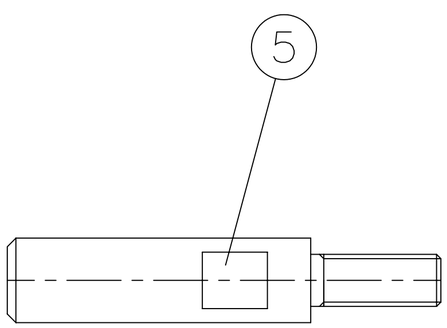
DATE	
DRAWN	
CHECKED	
VERSION	

TITLE	MOD.	NUMBER	VERS.
OPEN GATE TOOL	CNC	9B31124	00





ITEM	DESIGNATION	NUMBER	QTY.			WEIGHT
5	ROD DIA19.5	9C79429	1			
4	ROD DIA18.5	9C79403	1			
3	MANDREL WELL RAM FIXTURE	9E01621	1			
2	NUT DIN934 M20	0718300	1			
1	HANDLE	9C78967	1			

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WEIGHT		
DRAWN	23/11/2006	NAL
APPROVED FOR MANUFACTURING	24/11/2006	EPE
	SCALE: 1/1	

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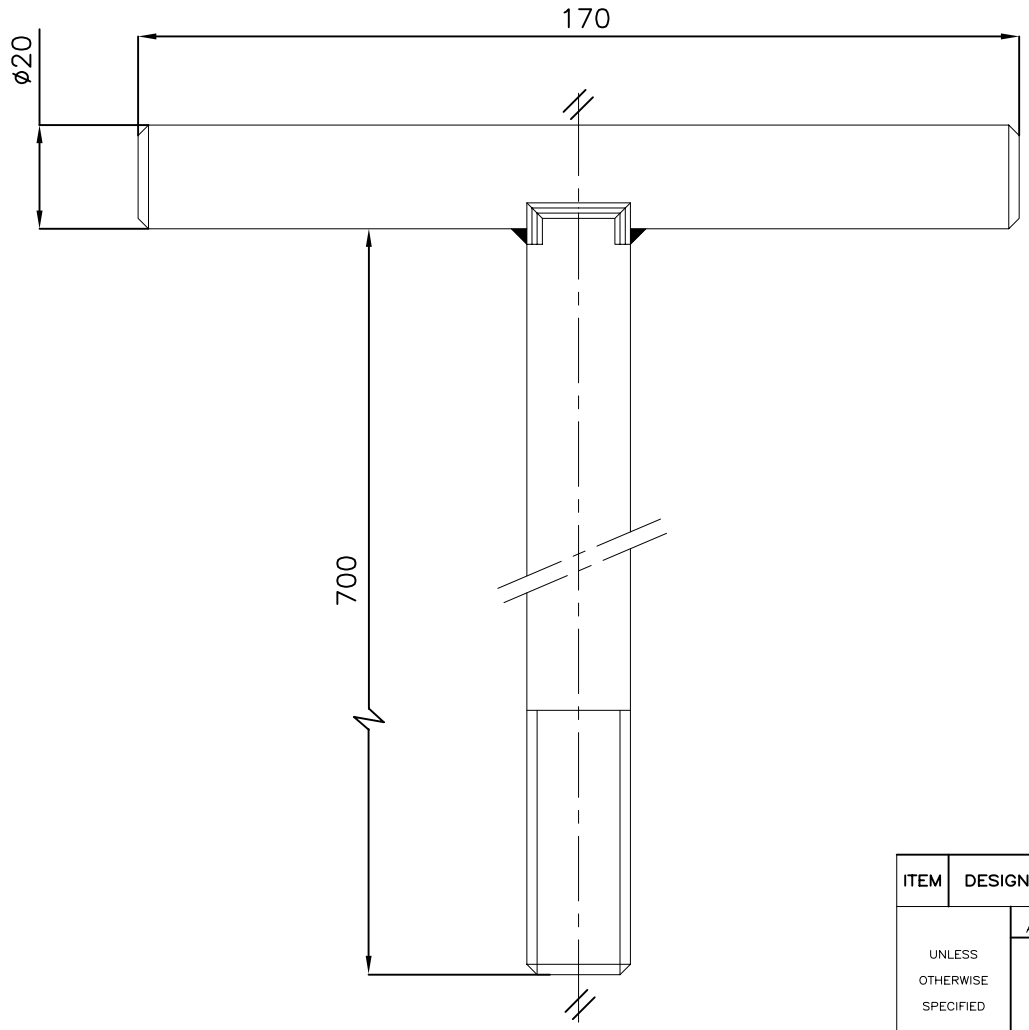
TITLE	MOD.	NUMBER	VERS.
WELL RAM FIXTURE ASSY	CNC	9E01622	0

VESUVIUS GROUP S.A.
Rue de Douvrain, 17
B-7011 GHLIN
BELGIQUE

Vesuvius Systems Ghlin | Item's part List | BOM Level: Level 0

	9E01622	**9E01622**	**WELL RAM FIXTURE ASSY**				**A2**

Level	Items	DWG Nbr	Type	Marker	Description	Quantity	Unit	Format
0	9C78967	9C78967 - 00	Item	1	HANDLE	1,00	PC	A3
0	0718300	0718300 -	Item	2	NUT DIN934 M20	1,00	PC	A4
0	9E01621	9E01621 - 00	Item	3	MANDREL WELL RAM FIXTURE	1,00	PC	A3
0	9C79403	9C79403 - 00	Item	4	ROD DIA18.5	1,00	PC	A3
0	9C79429	9C79429 - 00	Item	5	ROD DIA19.5	1,00	PC	A3



ITEM	DESIGNATION	NUMBER	QTY.	Name / Number / MATERIAL	WEIGHT

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6	30	±0.5
30	120	±0.8
120	315	±1.2
315	1000	±2.0
1000	2000	±3.0
2000	4000	±4.0

UNLESS OTHERWISE SPECIFIED

Angular tol : Undimensioned
radii : All sharp corners to be chamfered.

	DATE	BY
DRAWN	24/06/2005	DHE
CHECKED		
APPROVED FOR MANUFACTURING	29/11/2005	DME
PROJECT Nr	MACHINING	

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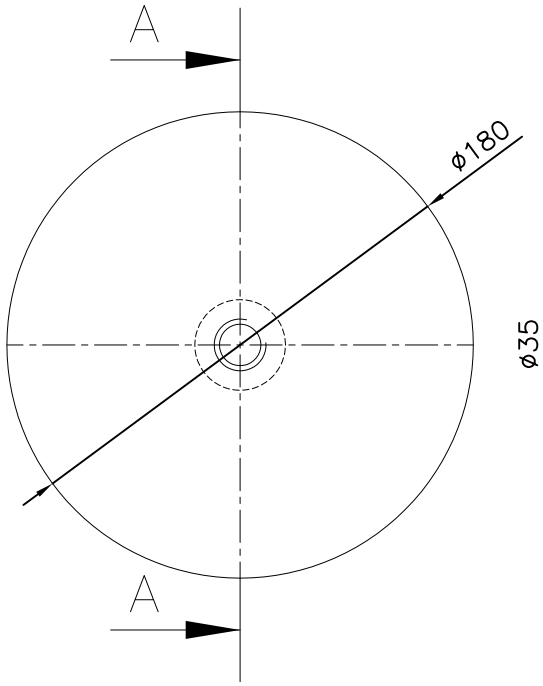
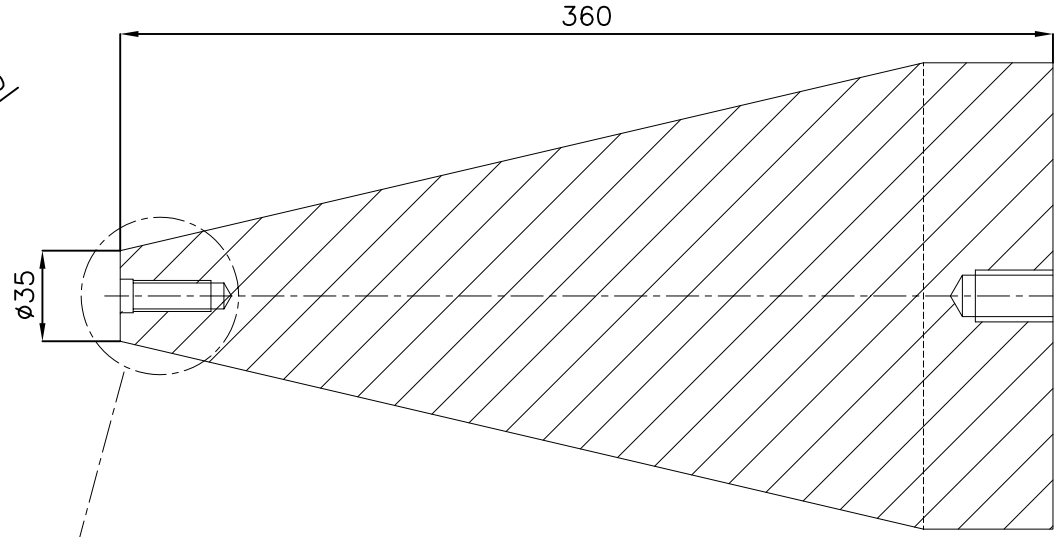
			DATE
			DRAWN
			CHECKED
			VERSION

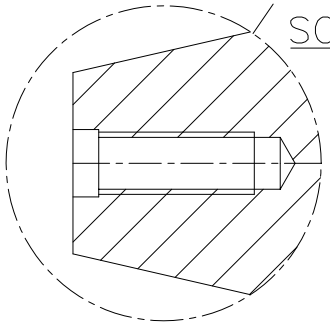
TITLE	MOD.	NUMBER	VERS.
HANDLE	CNC	9C78967	00



SECTION A–A



SCALE 1/1



ITEM	DESIGNATION	NUMBER	QTY.	Name / Number / MATERIAL	WEIGHT

UNLESS OTHERWISE SPECIFIED	Nominal dim. Above mm:	Nominal dim. until mm:	Linear tol. mm:	Angular tol : Undimensioned radii : All sharp corners to be chamfered.
	–	6	±0.2	
	6	30	±0.5	
	30	120	±0.8	
	120	315	±1.2	
	315	1000	±2.0	
	1000	2000	±3.0	
	2000	4000	±4.0	

MACHINING		
MATERIAL	ALUMINIUM	
WEIGHT		
DRAWN	23/11/2006	NAL
APPROVED FOR MANUFACTURING	24/11/2006	EPE
	SCALE: 1/2	

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NOTE 1 DETAIL
- Part number + Revision (BB)
- PO + initial of TTF (CC) + Machining PO number (XXXXXX)

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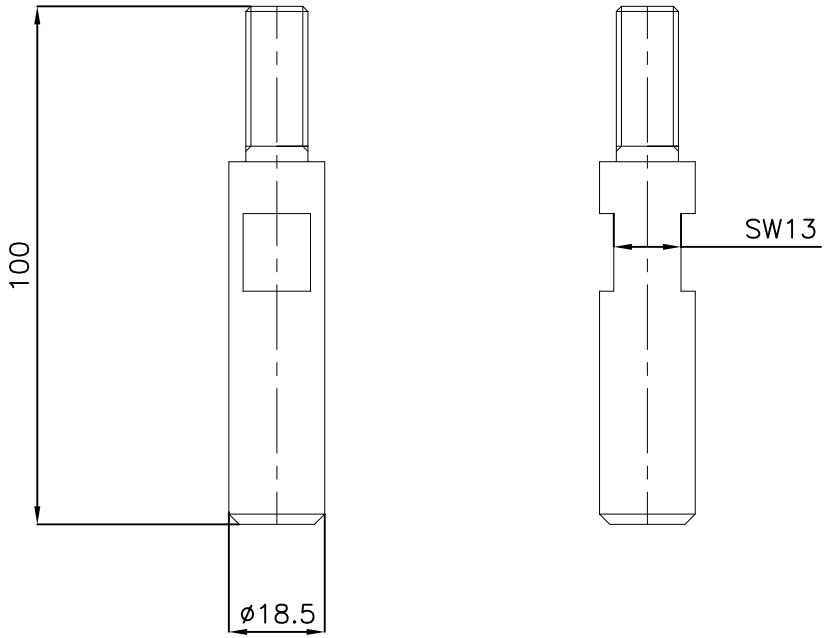
TITLE	MOD.	NUMBER	VERS.
MANDREL WELL RAM FIXTURE	CNC	9E01621	0



ITEM	DESIGNATION	NUMBER	QTY.	Name / Number / MATERIAL	WEIGHT

UNLESS OTHERWISE SPECIFIED	Nominal dim. Above mm:	Nominal dim. until mm:	Linear tol. mm:
	–	6	±0.2
	6	30	±0.5
	30	120	±0.8
	120	315	±1.2
	315	1000	±2.0
	1000	2000	±3.0
	2000	4000	±4.0

Angular tol : Undimensioned radii : All sharp corners to be chamfered.

	DATE	BY
DRAWN	24/06/2005	DHE
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APPROVED FOR MANUFACTURING	1/12/2005	DME
PROJECT Nr	MACHINING	

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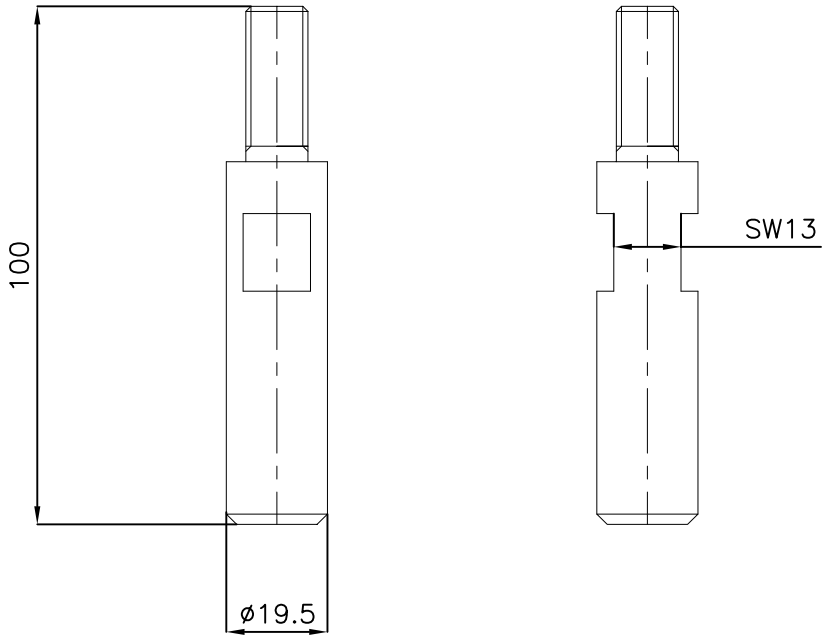
SCALE: 1 / 1

TITLE	MOD.	NUMBER	VERS.
ROD DIA18.5	CNC	9C79403	00



ITEM	DESIGNATION	NUMBER	QTY.	Name / Number / MATERIAL	WEIGHT

UNLESS OTHERWISE SPECIFIED	Nominal dim. Above mm:	Nominal dim. until mm:	Linear tol. mm:
	–	6	±0.2
	6	30	±0.5
	30	120	±0.8
	120	315	±1.2
	315	1000	±2.0
	1000	2000	±3.0
	2000	4000	±4.0

Angular tol : Undimensioned radii : All sharp corners to be chamfered.

	DATE	BY
DRAWN	24/06/2005	DHE
CHECKED		
APPROVED FOR MANUFACTURING	1/12/2005	DME
PROJECT Nr	MACHINING	

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			VERSION

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TITLE	MOD.	NUMBER	VERS.
ROD DIA19.5	CNC	9C79429	00

VESUVIUS SYSTEMS

CALIBRATED NOZZLE CHANGER

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VESUVIUS SYSTEMS

Casting the future together

CNC

CALIBRATED NOZZLE CHANGER SYSTEM

USER MANUAL

VESUVIUS SYSTEMS

Date : December 2004

VESUVIUS applied rigid quality assurance and quality control procedure based on national and international standards. In line with the policy of continuous improvement, VESUVIUS reserves the right to modify in details, the equipment as described and specified in this document.
Patent pending.

VESUVIUS SYSTEMS

CNC

CALIBRATED NOZZLE CHANGER SYSTEM

USER MANUEL

Date : December 2004

VESUVIUS applied rigid quality assurance and quality control procedure based on national and international standards. In line with the policy of continuous improvement, VESUVIUS reserves the right to modify in details, the equipment as described and specified in this document.

Patent pending.

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1 READ FIRST

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All information presented herein is based on the best available information at the time of printing. Caution must be taken by those using this manual to compare the information with current facilities and practices to verify the accuracy of the information. Furthermore, this manual must be read in conjunction with the customer file that contains the complete and detailed information about the equipment supplied by Vesuvius.

No license under any patent, trade marks, know how or proprietary interests of Vesuvius is granted or implied by the supply of this manual

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2 SAFETY

Any equipment under pressure must be pressure released before any intervention.

Fully respect and follow the Instructions and the User Manual delivered with the Material.

Handling of heavy load must follow the rules established by the plant. Handling devices have been defined for the lifting of the equipment. Always use the appropriate tool and approved handling devices, for any intervention (refer to the Handling Instructions in section 10.3).

The Maximum load of the lifting device(s) provided by Vesuvius must be respected

Individual Protection Equipment (IPE) must be worn during operations: i.t.s. gloves, goggles, glasses, security helmet, safety shoes, working clothes.

The use of any piece of equipment supplied by Vesuvius or described in this documentation, other than its specifically described use is strictly forbidden.

(G:\ENG\PRODUCT_FILE\SOURCE\CNC\13_user instructions (manuals)\UK\CNC_user_manual_rev4.doc) Rev.04

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3 PRODUCT DESCRIPTION

3.1 Mechanism

The **CNC** consists of a small number of parts as illustrated on the below figure. The main feature of the **CNC** is that it is composed of two halves (Male & Female) that are articulated on a vertical rotation shaft. This specific feature allows the removal of the gate. The two halves are secured together by one T-bolt.

Figure 1 shows a typical view of the mechanism. A more accurate information, including the parts order references, is accessible in the customer file that is delivered with the mechanism.

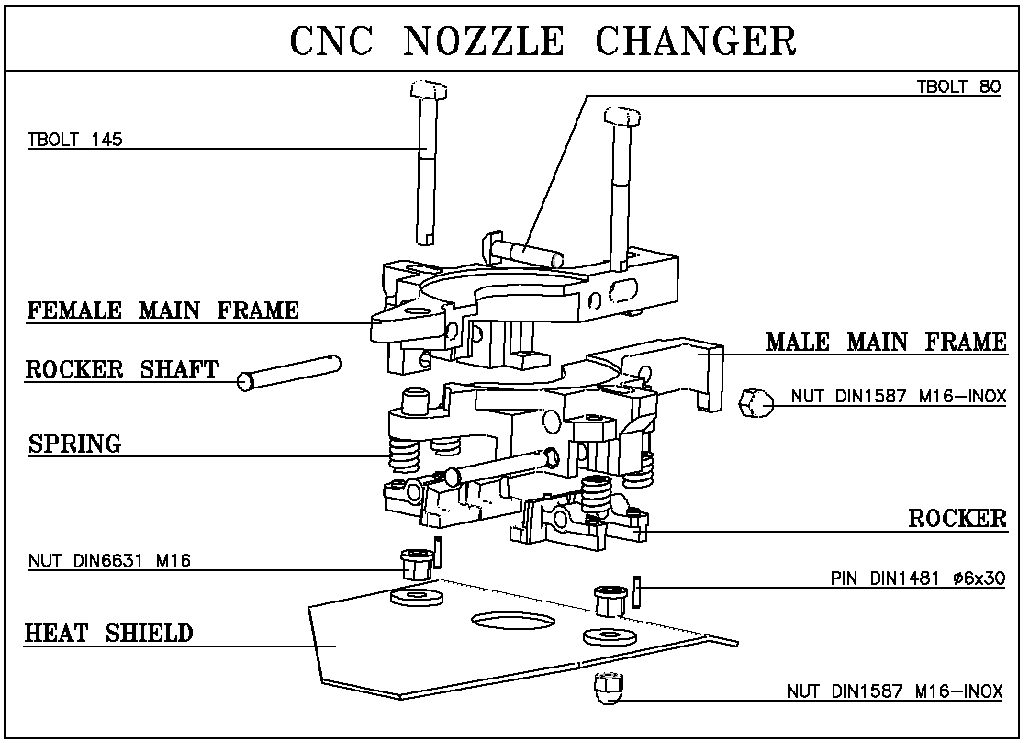

Fig. 1

The plate's loading system consists of four springs acting on individual rockers that are articulated on two axes.

Each half of the mechanism is efficiently protected from splashes and radiation by a stainless steel heat shield. An additional front heat shield is provided to protect the entrance side of the mechanism when the cylinder is removed.

The mechanism is attached to the tundish by two T-bolts, one for each half. The attachment T-bolt are multipurpose to fix the heat shield to the mechanism and the mechanism to the tundish.

Cap nuts are supplied to protect the T-bolts threads from splashes.

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The gate, assembled with the refractories, can be handled without any jack or handling facilities by one operator (see section 10 for detail). The "Tail" machined on the female half associated with the steel support welded on the tundish bottom allows the mechanism to be maintained easily in position with one hand while placing the T-bolts.

3.2 PLATE LOADER ASSEMBLY

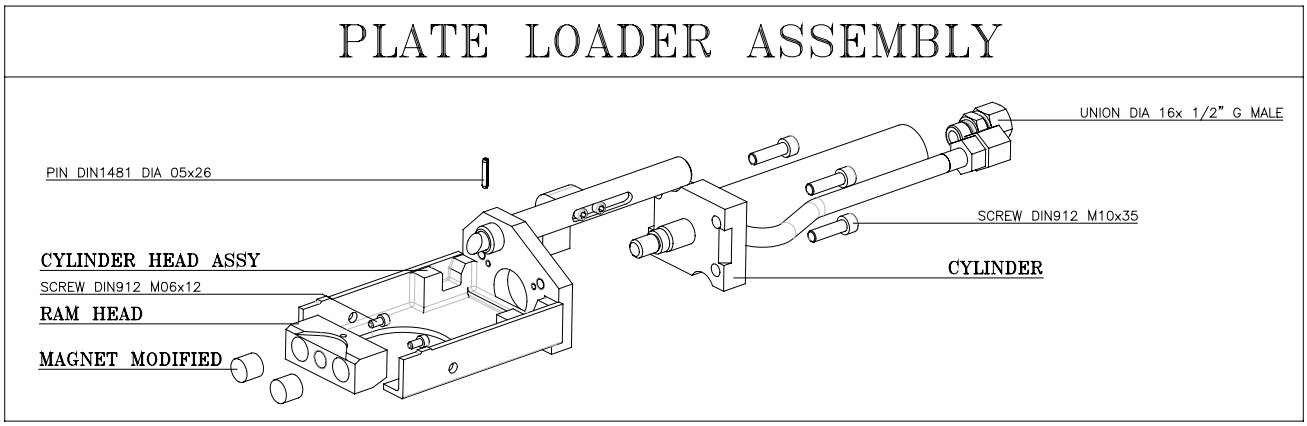

Fig. 2

The Plate Loader is composed of a double acting cylinder equipped with a support to handle a bottom plate or blank plate and a locking device (spring loaded, self locking system) to secure the cylinder on the mechanism. The Plate is pushed in place by the Ram Head fixed on the Cylinder Rod.

Its lightweight makes it very easy to handle (see section 10.2 for details).

Note: fire resistant hydraulic fluid is recommended (HFD or HFC)

3.3 HYDRAULIC HOSES

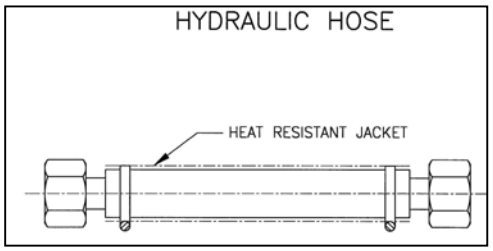

Fig. 3

The hydraulic hose is a high-pressure hose protected with a heat resistant jacket. The hose will be chosen according to the customer installation and the hydraulic fluid.

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3.4 HYDRAULIC POWER

3.4.1 HYDRAULIC UNIT (BASIC OPTION)

This is a mobile hydraulic unit including:

- 25l tank;
- 10L/min gear pump (4kWatt);
- 5l accumulator;
- Manual directional valve;
- Flow regulator.

Refer to the User Manual of the Hydraulic Unit supplier for more detailed information.

Fig. 4

3.4.2 HYDRAULIC UNIT (FULL OPTION)

The installation includes:

- Pumping unit;
- Accumulator;
- Isolation valve block;
- Valve package.

Refer to the User Manual of the Hydraulic Unit supplier for more detailed information.

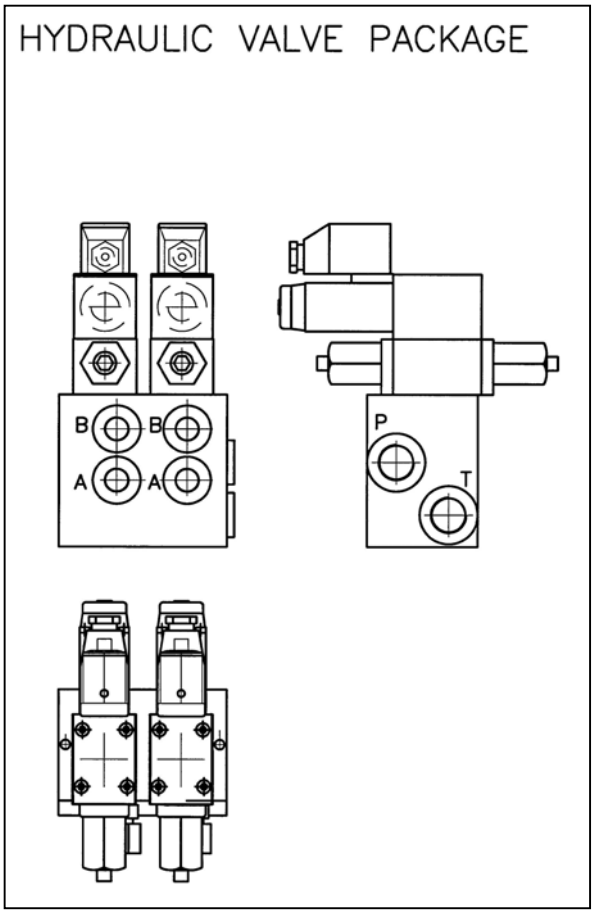

Fig. 5

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3.5 Refractories

The enclosed figure shows the typical refractory arrangement used to operate the **CNC:**

The VESUVIUS REFRACTORIES are supplied ready to use.

3.5.1 TOP PLATE

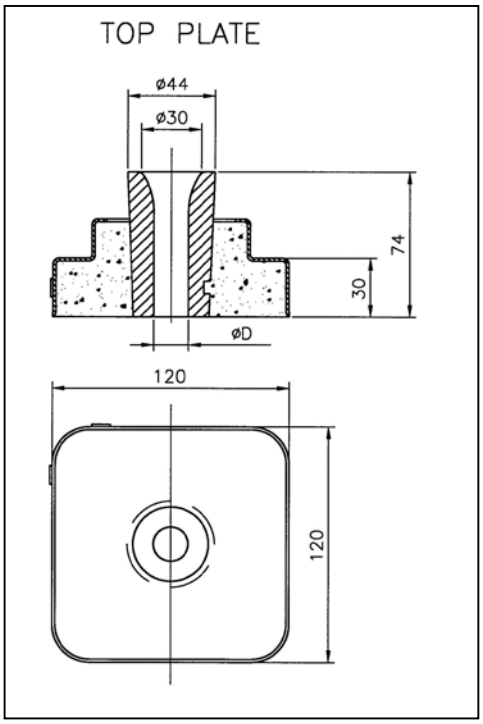

Fig. 6

The top plate ends the permanent part of the casting channel and is designed to last a complete sequence.

This plate consists of a high resistance zirconia insert which is put in a high alumina plate. The lower face is machined to insure a perfect sealing with the bottom plate. The plate is canned to provide a good mechanical reference for the positioning and a strong cohesion.

The alumina also has the advantage to be a thermal insulating material.

The top plate must be mounted in the mechanism with the cardboard positioned at the entrance side of the gate. Thus, when the two halves of the frame are closed, the top plate will be automatically pushed in the right position against the frame by the compression of the cardboard. This very simple design avoids adding a mechanical positioning device to the mechanism and protects the refractory lining from adverse reactions.

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3.5.2 BOTTOM PLATE

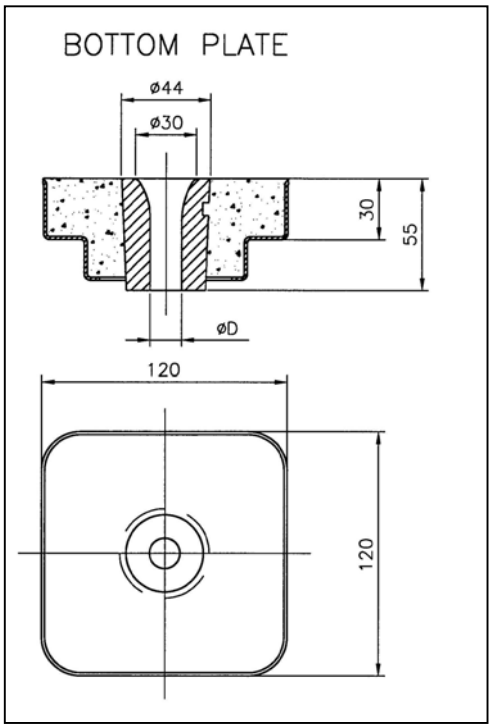

Fig. 7

The bottom plate is manufactured with the same can as the top plate and consists of a calibrated zirconia nozzle inserted in high alumina plate. The working face of the bottom plate is also machined.

The bore size of the Bottom Plate must always be smaller than the Top Plate

The maximum bore size is 20mm diameter.

3.5.3 BLANK PLATE

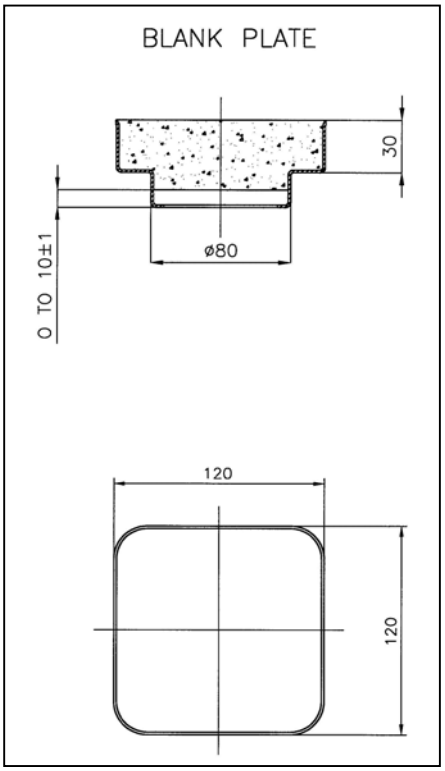

Fig. 8

Manufactured with the same can as the top and bottom plates, the high alumina blank plate allows closing the casting channel at any time in case of need or emergency.

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3.5.4 CERAPAPER JOINT

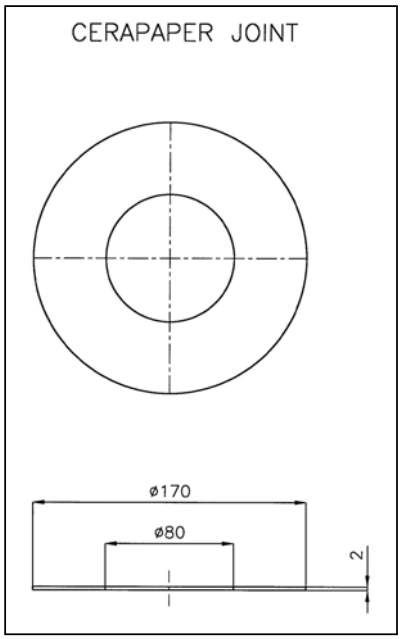

Fig. 9

A 2mm thick cerapaper ring is put on the mechanism before to be installed on the tundish. This ring avoids the ramming mass to stick on the back of the mechanism and facilitates the dismounting and the cleaning of the mechanism.

3.5.5 WELL BLOCK

The recommended process is to ram the well block after mounting the mechanism on the tundish. A metal mandrel is used to fix the geometry of casting channel.

3.5.6 STARTER TUBE

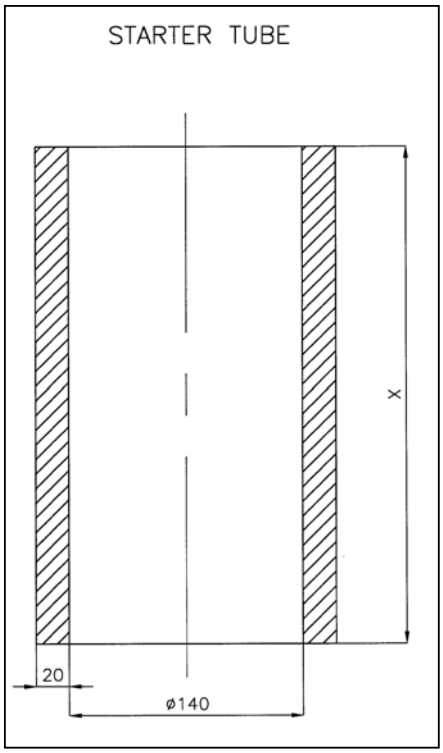

Fig. 10

Whatever various procedures used for the start up, we recommend using a starter tube to avoid start up problems due to cold steel and possible carries of inadequate parts in the casting channel. The starter tube generally consists of a tube that is mortared in the casting channel after the gunning of the tundish.

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4 PREPARATION AREA

As they are easily transportable the gates can be assembled anywhere. We suggest to mount the gates on the tundish at the tundish preparation area and to ram the well-block. When assembling, tundish should be horizontal on a stand where access is possible from under each strand. The gates can be removed on the casting platform after the cast or wherever access is provided under the tundish.

4.1 SPECIAL TOOLS

The **CNC** is specially designed to be operated and maintained with a limited number of tools (Fig. 12):

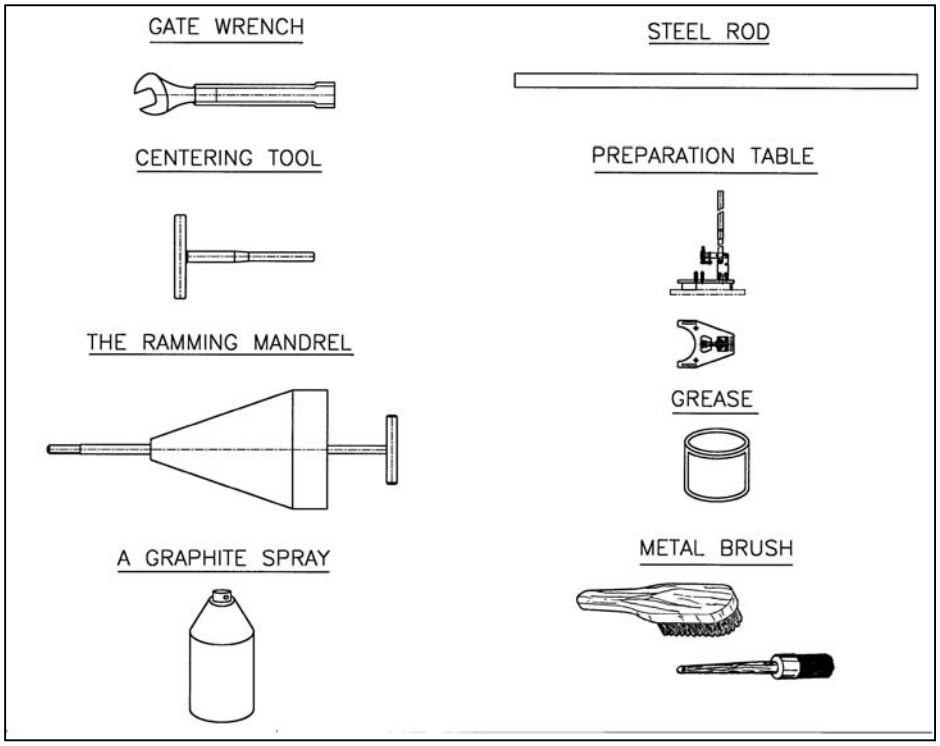

Fig. 12

- The M24 wrenches is sufficient to operate and maintain the mechanism;
- A steel rod (diameter: 20mm - length: 1m) to open and handle the halves of the mechanism;
- A centering tool (diameter adapted to the customer) to position the plates during the assembling;
- A preparation table to facilitate the gate preparation and the maintenance;

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- A ramming mandrel to ram the well nozzle;
- A metal brush to clean the parts;
- Grease and brush (High Temperature anti-seizing grease only / recommended grease: Wolfracoat C)
- A graphite spray.

Only a preparation table is necessary to prepare the CNC.

4.2 DESCRIPTION OF THE PREPARATION TABLE

The preparation table is designed as a tooling to be used with the CNC for doing the following tasks:

- To mount the refractories in the mechanism;
- To assemble-disassemble the mechanism.

The preparation table mainly consists of:

- A supporting table attached to the workbench in the preparation area;
- An adjustable toggle clamp system bolted to the supporting table.

The toggle clamp is operated manually and allows to compress the springs on the half of the mechanism put on the supporting table.

Locating pins on the supporting table allows to position properly the half of the mechanism.

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4.3 INSTALLATION OF THE PREPARATION TABLE

The preparation table is put in the preparation area on a workbench (Fig. 11).

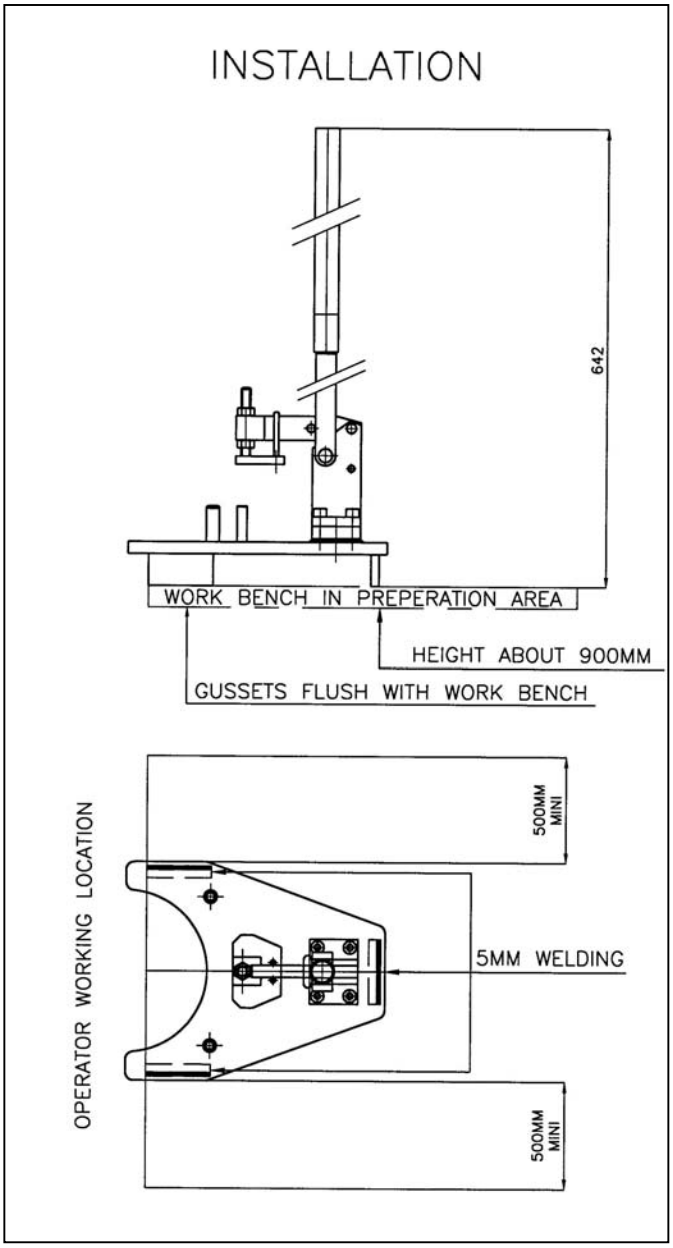

Fig.11

Find a place where there is enough space in front and sideways of the preparation table to handle the mechanisms easily and to operate the handle of the toggle clamp.

Both front gussets under the supporting table should be flush with the edge of the workbench.

Weld the 3 gussets on the workbench with a 5mm welding.

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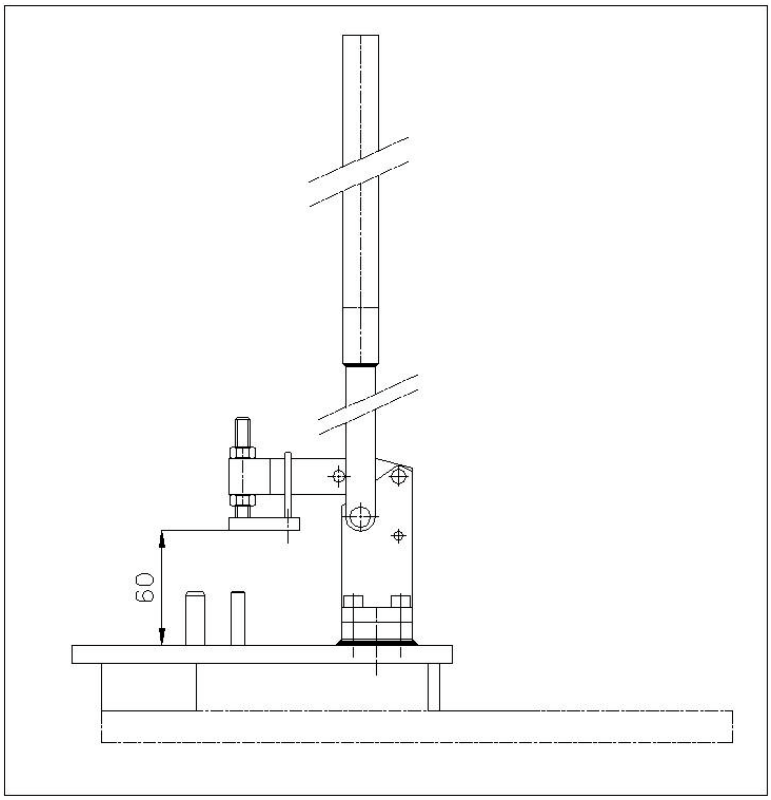
4.4 STROKE ADJUSTMENT FOR THE PREPARATION AREA

- Put the toggle clamp handle in vertical position;
- Loosen the two nuts locking the toggle pusher head and adjust the distance between the supporting table and the toggle pusher head to 60 mm by operating first the upper nut. Secure the position by tightening the lower nut;



- Push the toggle handle to open the clamp;
- Position a half mechanism (T-bolt must be removed) on the locating pins of the supporting table (centre pin of the supporting table must enter the hole in the mechanism for the T-bolt);
- Put the toggle clamp arm in vertical position, loosen two turns the upper nut and tighten the lower nut slowly trying to move the rocker axis with the other hand. The right adjustment is achieved when the rocker axis is free to move;
- Tighten the two nuts and check that the adjustment is still valid;
- Check that the rocker axis is free with another half of mechanism.

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5 TUNDISH ADAPTATION

5.1 DESCRIPTION

The tundish adaptation (Fig. 13) for each strand is reduced to the minimum and includes:

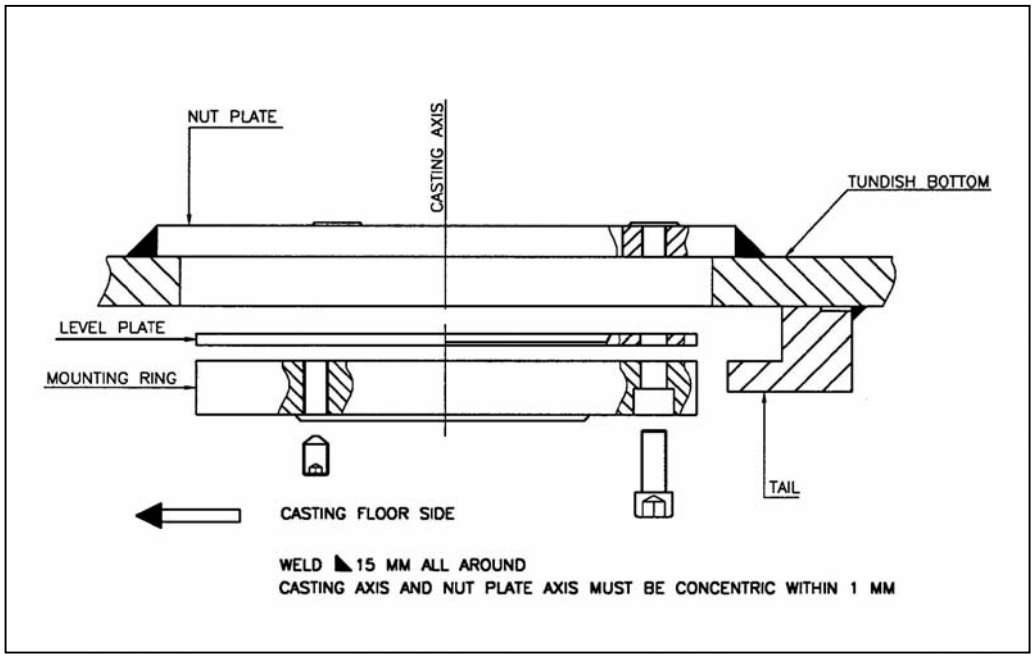

Fig. 13

- The ***NUT PLATE*** welded inside the tundish bottom;
- The ***MOUNTING RING*** is attached to the nut plate with three hexagonal socket screws. Three hexagonal socket set screws are also located in the mounting ring to allow the adjustment of the level of the mounting ring at any moment in all directions. Thus, the flatness and further warpages of the tundish bottom are not critical and can be easily compensated.

  The mounting ring includes the pockets and the centering ring for the positioning of the mechanism.

  The mounting ring is located inside of the tundish thickness. Only a few millimeters stand out the tundish thickness; therefore this part is not exposed to damage and the length of the casting channel is reduced;

- The ***STAINLESS STEEL LEVEL PLATE***, sandwiched between the nut plate and the mounting ring fulfils several objectives:

  - ❖ Adaptation to the thickness of the tundish bottom;
  - ❖ Thermal insulation of the mounting ring and mechanism;
  - ❖ Protection of the T-bolt pockets from dust and mortar when relining the tundish.

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- The "***TAIL***" is welded on the tundish bottom for the following reasons:
  - ❖ To help the operator during the mounting of the gate.
  - ❖ To protect the mounting ring when the tundish is put on the ground.

5.2 INSTALLATION ON THE TUNDISH

The centering tool is used to install and weld the nut plate inside the tundish as shown on the Fig. 14.

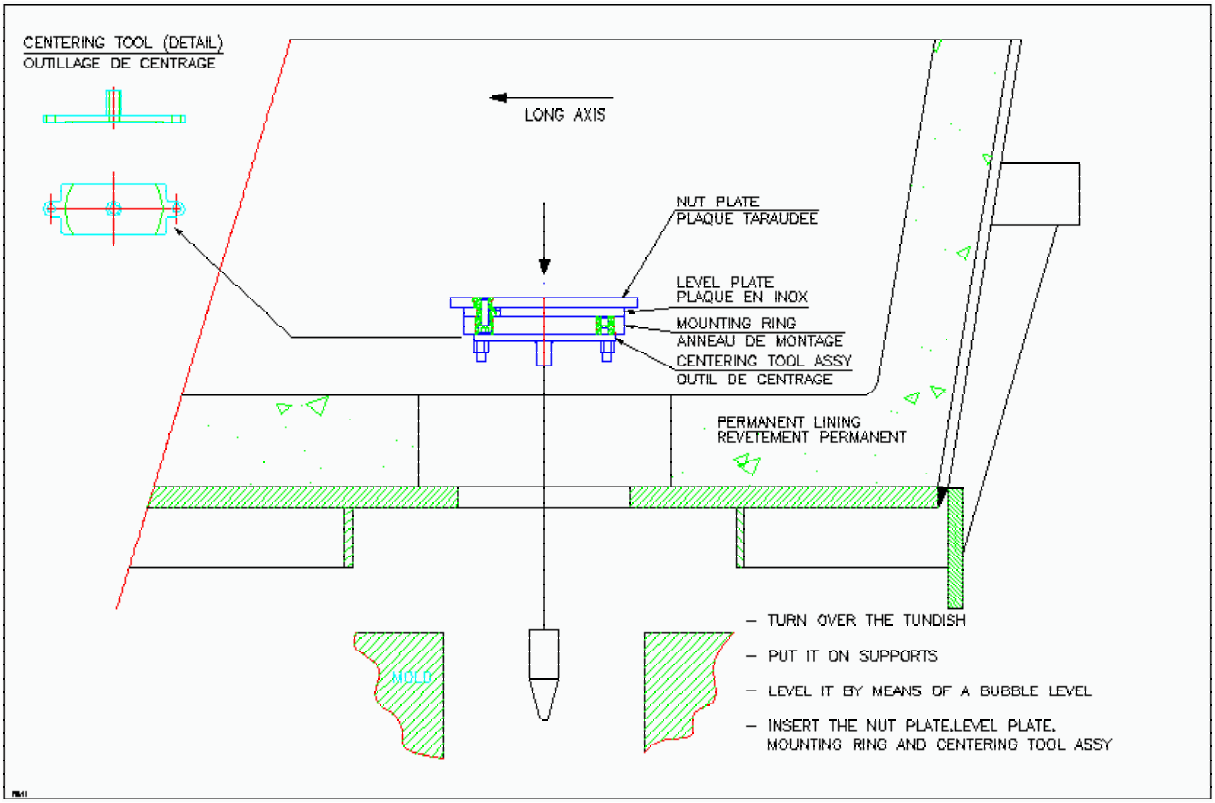

Fig. 14

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6 HYDRAULIC

6.1 HYDRAULIC AND ELECTRIC INSTALLATION

We recommend the installation of both the accumulator isolation valve block and the valve package on the tundish car.

It is recommended to use a fire resistant hydraulic fluid (HFC, HFD).

6.2 ELECTRIC

Some electric installation will have to be done to control the valve packages and isolation valve block:

- An operator's panel on casting platform for the selection of the tundish car.
- A push button and a lamp for the change itself. This can be integrated in existing strand control panel.
- A control cabinet installed in control room. This cabinet must have the appropriate logic to control the car selection, the isolation block, the valve package solenoid valves. The cabinet controls also the hydraulic and electric status.
- Cabling between operator panel, strand panels, control cabinet and valves on the two tundish cars.

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7 OPERATING PROCEDURE

Prior to the introduction of the refractories in the mechanism:

* Brush the back of the two main frames to remove the residual cerapaper seal;
* Brush and grease the rotation shaft of the male main frame with high temperature anti-seizing grease (Wolfracoat C).

7.1 LOADING OF REFRACTORIES IN THE MECHANISM

- Position a "Male" half mechanism (without T-bolt) on the preparation table with the clamp open and pull the clamp handle in vertical position (self locked position).

- Position a top plate and a bottom plate together, top plate down. The two plates are crossed at 45°. Make sure that the two red cardboard's located on the top plate are positioned towards the cylinder side and that the holes of top and bottom plates are aligned.

- Release the spring pressure by pushing the clamp handle in open position.

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- Remove the male half CNC from the preparation table and store it on the workbench (taking care not to damage the refractories).
- Position a "Female" half of CNC on the preparation table and pull the clamp handle in vertical position (self locking position).
- Take the male half previously assembled and put the CNC hinge in the female half.

- Rotate the male half to close the mechanism.
- Secure the two halves together with the attachment bolt (every time cleaned and greased with Wolfracoat C).
- Release the spring pressure on the female half by pushing the clamp handle in open position.
- Remove the complete mechanism from the preparation table and store, taking care not to damage the refractories.
- Mount two T-bolts (every time cleaned and greased with Wolfracoat C).

The gate is now ready to be mounted on the tundish.

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7.2 MECHANISM INSTALLATION

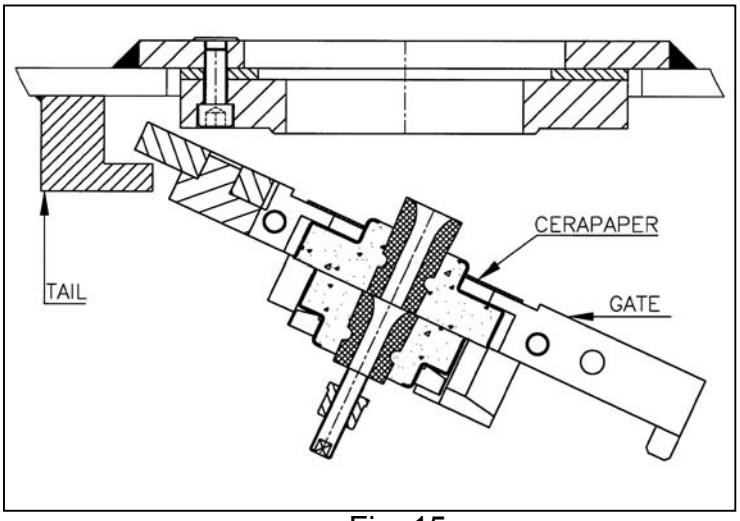

Fig. 15

- Check that the T-bolts nuts are unscrewed enough;
- Check that the top plate insert is not damaged;
- Put the cerapaper seal on the top of the gate;
- Carry the gate with the top plate up and insert the tail of the gate on the "Tail" support block of the tundish.

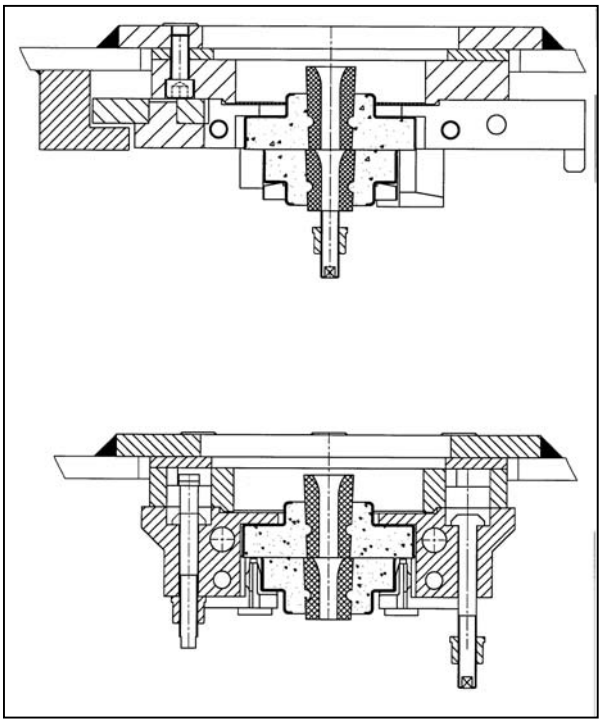

Fig. 16

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- With one hand supporting the entrance side of the mechanism, lift up the gate against the mounting ring;

- With the other hand push up one of the two T-bolts into the slot of the mounting ring, turn it a quarter of turn to engage it and tighten it by hand. When released, the bolt may not fall down and the flat end of the T-bolt should be parallel to the gate axis. The gate is now attached to the tundish and may be released;

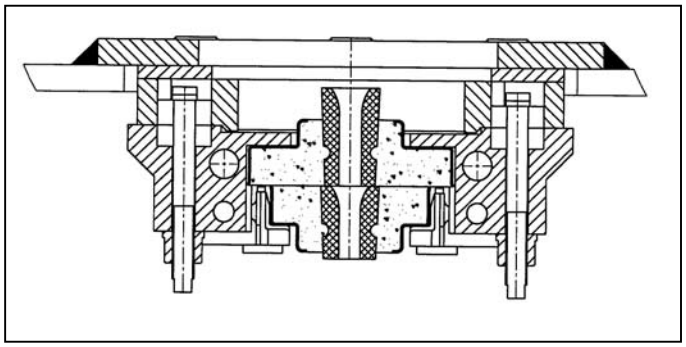

Fig. 17

- Push the other T-bolt in position and tighten it manually;

- Torque the two T-bolt nuts;

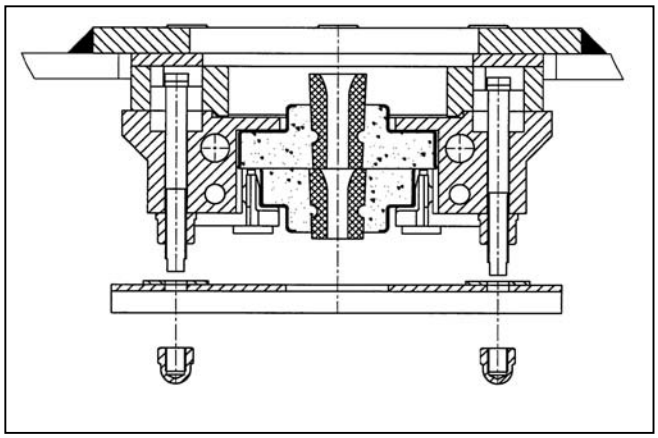

Fig. 18

- Take the heat shield and screw the two cap nuts on each T-bolt to protect them against splashes.

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7.3 TUNDISH MAKE-UP

- Position the mandrel
- Ram the well material

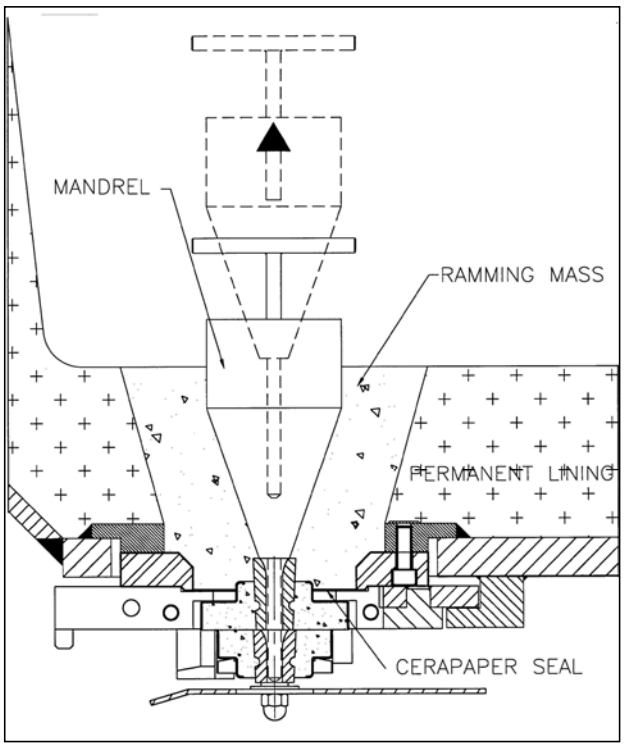

Fig. 19

- Remove the mandrel.
- Plug the well.
- Prepare the working lining as usual.

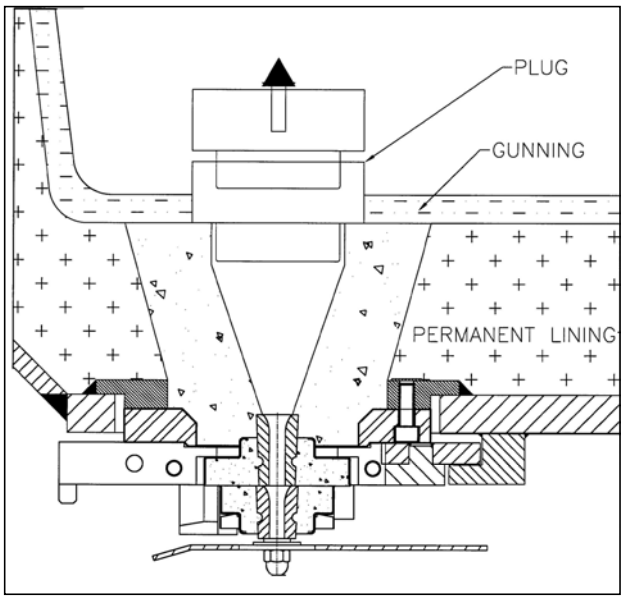

Fig. 20

Remark : The outside diameter of plug equal outside diameter of the starter tube

- Remove the plug.

Other methods exist. It depends on the steel plant.

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7.4 PREHEATING

The tundish will be preheated as usual. The common procedure is to preheat from the top. During preheating, place the front heat shield on the mechanism.

7.4.1 OPEN STREAM

Install the chromite and the repe for each strand.

7.4.2 PROTECTED STREAM

- Install the starter tube;
- Load a shroud and a middle plate into the gate. This special middle plate will have a bigger bore (40) to get enough heat transfer to the tube.

After one hour, the typical temperature of the tube should be 1000° C. If necessary, each strand must be equipped with a Venturi system.

7.5 PLATE CHANGE

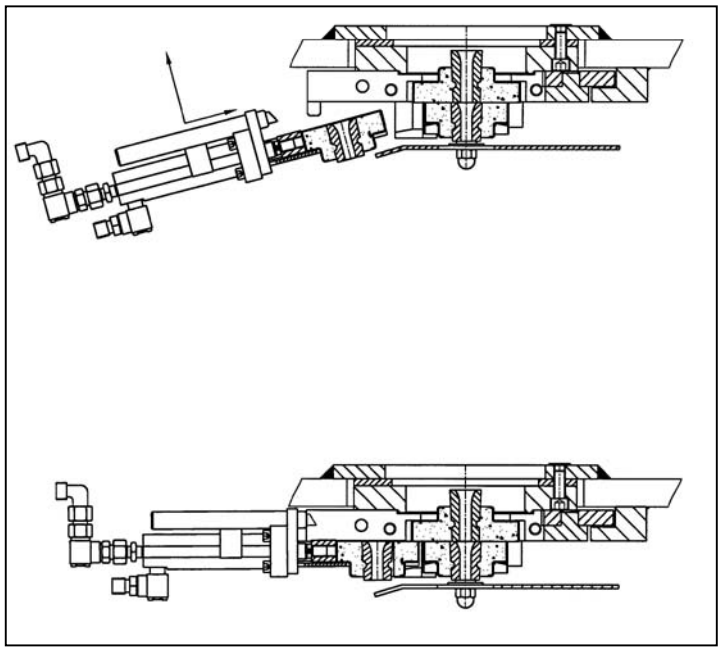

Fig. 21

- Check that the hydraulic unit is on;
- Load a new plate into the cylinder head and move to the strand where the plate must be changed;
- Remove the front heat shield from the mechanism (if used);
- Insert the cylinder head down the mechanism into the guides;

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- Lift the cylinder in horizontal position against the gate's frame till the lock is engaged and check if the cylinder is properly locked by shaking it up and down;
- Move to the manual valve on the hydraulic unit.

CAUTION: For safety reasons, nobody can touch the cylinder when actuating the valve.

- Actuate the valve. Keep the valve handle actuated one second at least to make sure that the stroke is completed (manual valve);

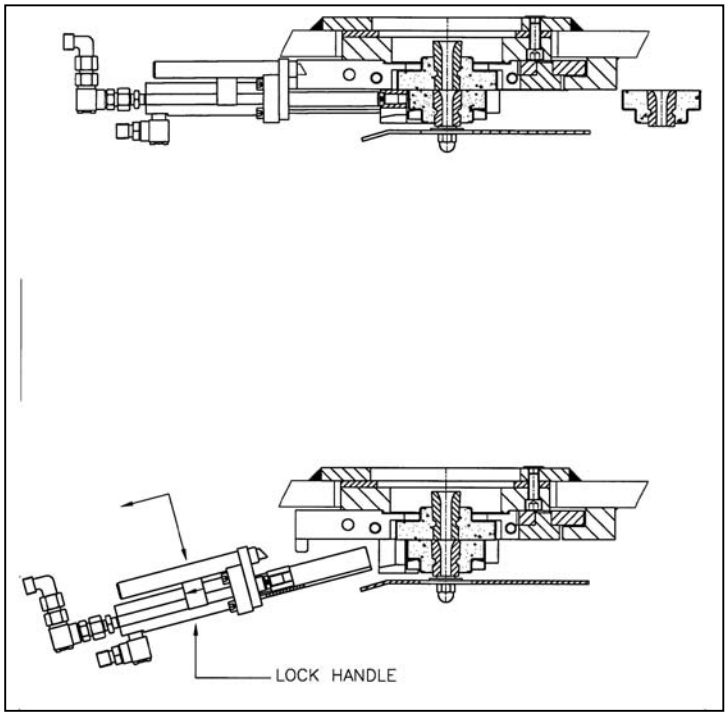

Fig. 22

- Unlock the cylinder by pulling the lock handle;

If basic option used (a Mobile Hydraulic Unit see section 3.4):

- Remove the cylinder and replace it immediately by the front heat shield (only if the cylinder is not stationary);
- Store the cylinder and hose (only if the cylinder is not stationary).

If full option used (a valve package see section 3.4):

- Remove the cylinder;
- Load a blank plate;
- Install the cylinder back on the CNC.

Note: It is recommended to keep a Blank Plate always in the CNC to allow a shut-off of a line at any time or an emergency close.

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7.6 END OF THE CAST

Generally firing a blank plate in each strand to close the line will terminate the cast. The removal of the gate must be achieved before de-sculling.
The removal of the gates from the tundish may be performed everywhere an access is available to the gates from under the tundish.
After the cast, let the tundish 10 minutes minimum till the steel freezes inside the casting channel before removing the gates from the tundish (drained tundish).

- Remove the nuts from the two T-bolts;
- Take out the heat shield;
- Insert the 20mm steel rod into the hole of the male frame
- Free the two halves of the frame by unscrewing the nut of the T-bolt 75, turning it 90 degrees and sliding it out
- Loosen the T-bolt nut of the male frame (on your left side when facing the front of the gate) turn the T-bolt and slide them out;
- Force the male frame open by pushing the rod outside. The male frame will be disconnected from the refractories and female frame.

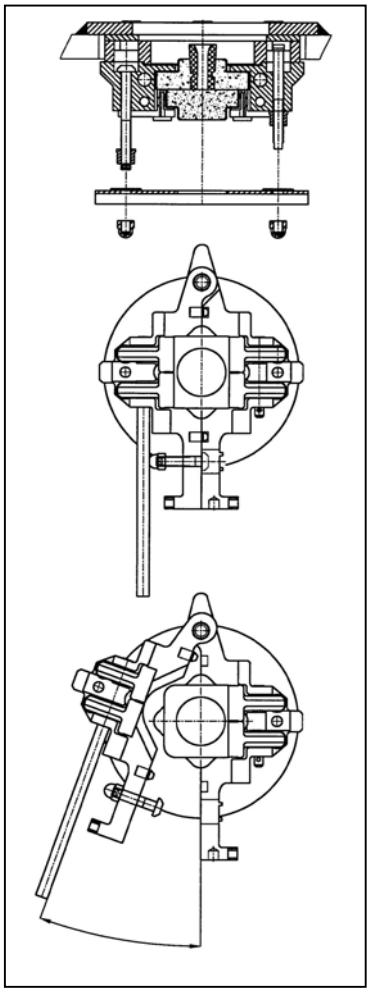

Fig. 23

Notes : The 25mm bore in each half allows this opening of the frame and the handling of the hot part.

A mobile box filled with sand or similar system should be placed under the CNC to avoid any falling damage on the CNC if it gets out of hands or if the refractories are loosen by the stroke.

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- Loosen the T-bolt nut from the female half, turn it and pull it down. The female half will not fall down as it is hooked on the top plate;

- Insert the rod into the hole of the female frame.

- Force the female half out of the refractories.

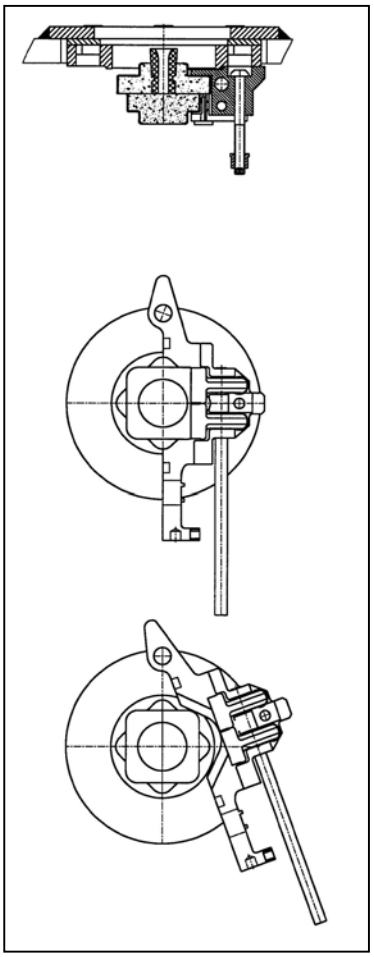

Fig. 24

The tundish is ready for de-sculling and the top plate, attached to the skull, can pass freely through the hole in the mounting ring.

The mechanism is immediately available to load new refractories and re-enter the production on another tundish.

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8 MAINTENANCE PROCEDURE

After 50 sequences, the machine must be completely taken apart and inspected

8.1 MAINTENANCE TOOLS

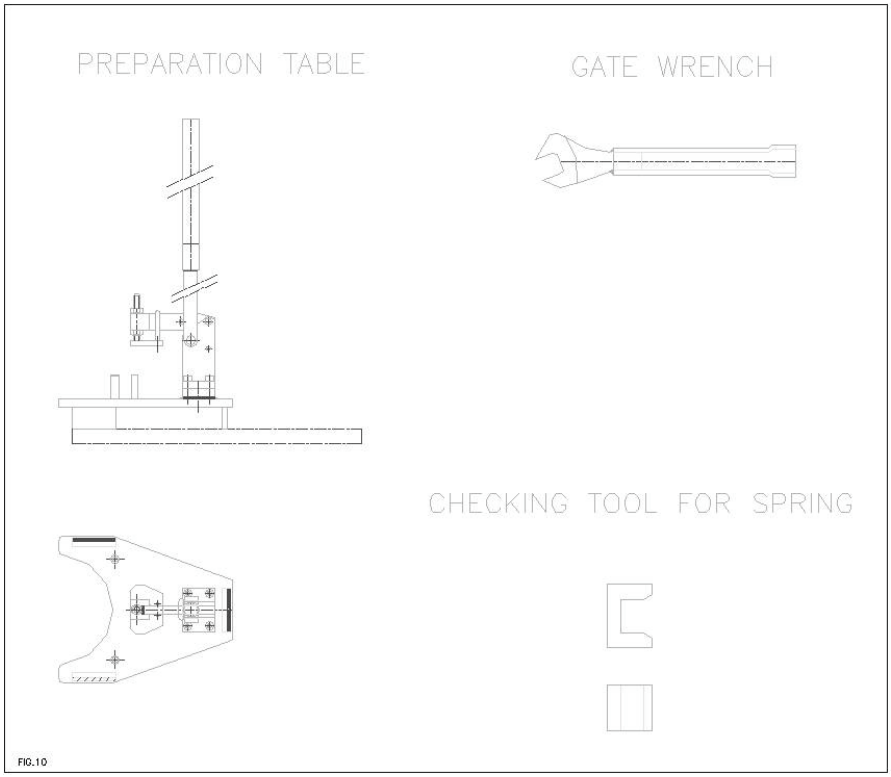

Fig. 25

The wrenches and the table necessary for the maintenance are the same as those used for the operation.

The checking tool for spring is a simple GO-NO GO gauge to control the wear of the springs.

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8.2 CNC DISASSEMBLING

The same procedure is valid for male and female halves.

- Remove the refractories from the mechanism if any.
- Position a half of CNC on the preparation table (without T-bolt)

- Remove the split pin of the rocker axis.

- Put the Toggle Clamps in close Position by pulling the handle.

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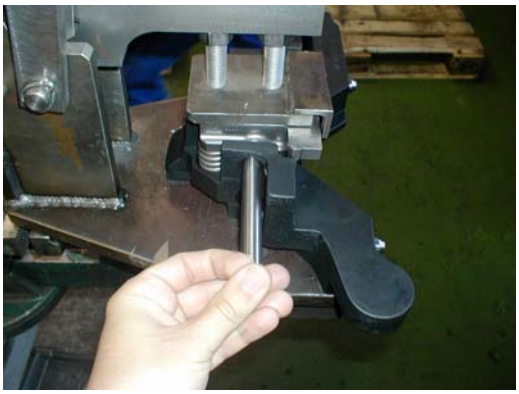
- Pull the rocker axis out of the mechanism.



- Put the toggle clamp in open position by pushing the handle.

The two rockers and the two springs are now free to be removed from the mechanism for checking or replacement.

- Clean each part and check carefully for deformation and wear (see section 8.3)

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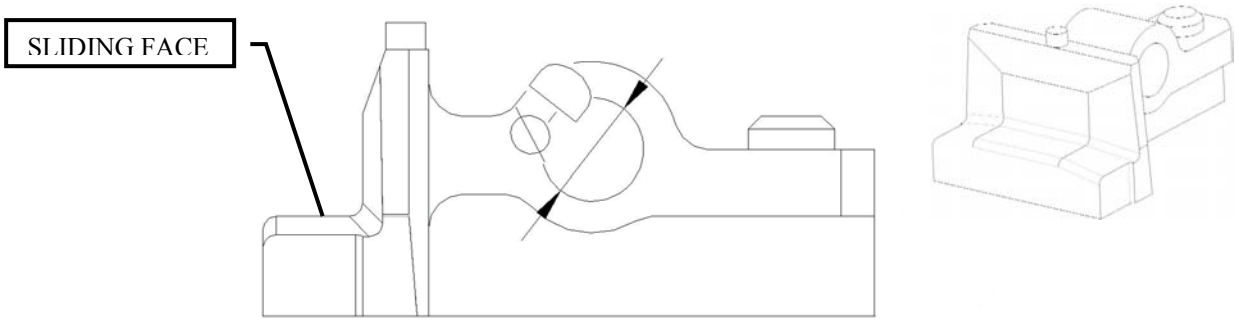
8.3 INSPECTION

8.3.1 INSPECTION OF THE ROCKERS

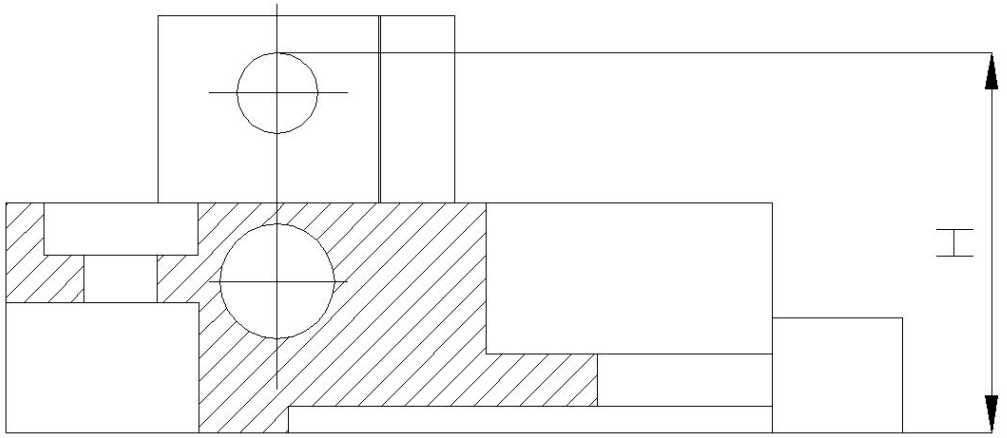
- Thoroughly clean the Rocker before outgoing any measurement.
- If an abnormal wear is observed locally on the Rocker sliding face or on the surface of the hole, the Rocker should be replaced.



- Use a micrometer to measure the **diameter D**. *It should not be more than **15.95 mm***

8.3.2 MAIN FRAME

- Clean the Male and the Female parts from steel splashes, dust, etc… and inspect them for damages.
- Check the planarity of the Frame, using a 200mm straight ruler. If it is possible to place a **0.6mm feeler gauge** under the ruler, the part must be discarded.
- Measure the dimension "**H**" between the reference face and the top of the Hole where the Rocker shaft sits, as shown on the sketch. If the Dimension is bigger than **73.50 mm, it must be discarded.**



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- Measure the dimension "**M**" between the center of the hole and the face of the Frame as shown on the sketch below.

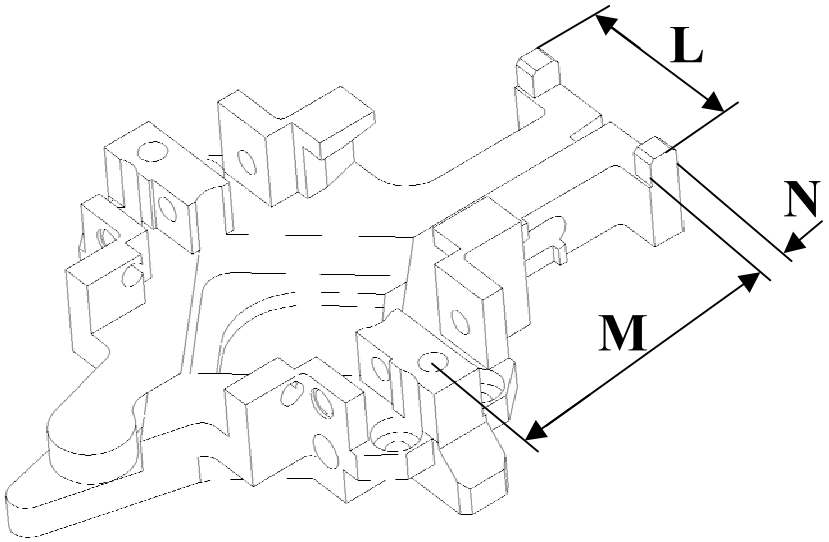
*The measurement **M** must be **between 209.5 and 210.5 mm** otherwise replace the frame by a new one*

- Measure the thickness "**N**" of the positioning tooth of the Frame as shown on the sketch below.

*The measurement **N** must be **between 18 and 19 mm** otherwise replace the frame by a new one*

- While opening the CNC, the two frames should not be damaged. If it is not possible to close the two parts against each other, inspect further in order to locate and suppress the additional point of contact.

- With both Frame attached together, check the outside dimension "**L**" of the Assembly where the Plate Loader is engaged (see sketch below).



*Shocks and damage can change the geometry of the parts. <u>It should never</u> be **<u>more than 120.5 mm</u>**.*

If the measurement is bigger than 120.5mm, it means that the two frames are not properly closed against each other. Each half mechanism must be disconnected and inspected to spot and remove any splash or sharp edge that provoke the difference in the measurement.

- If excessive wear is observed locally on the Frame or any Rockers, contact your local Vesuvius Representative (see 11.2 Customer Service).

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8.3.3 ROCKER SHAFT

- Clean thoroughly the Shaft and the hole for the small pin. Control that there is no local excessive wear on the surface of the shaft.
- Measure on 3 different points the Diameter. *If it is smaller than **14.2 mm** even only on one place*, **replace the shaft**.

8.3.4 SPRING

- Test the Spring with the "checking tool for Spring".

If the spring goes in the checking tool, then the spring must be rejected.

As the spring might be bent, if any point of the spring goes into the gauge, the spring must be rejected.

8.3.5 HEAT SHIELD

Check the dimension of the central hole of the Heat Shield

If the diameter of the hole **is bigger than 85mm**, **replace the Heat Shield**

Note : If the installation uses a Bellow Shroud that requires a Heat Shield with a bigger bore than 80mm, the CNC cannot be used without the bellow shroud otherwise it must be equipped with a standard Heat Shield (diameter 80mm).

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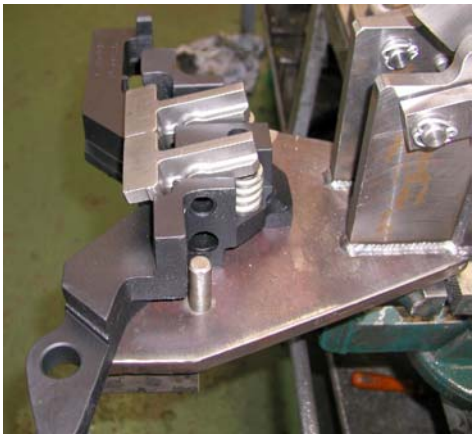
8.4 CNC ASSEMBLING

The same procedure is valid for both male and female halves.

- Position the frame of a half of CNC on the preparation table with the clamp in open position.

- Position two springs in the locating holes of the frame.

- Place one rocker above each spring so that they are roughly in the right position.



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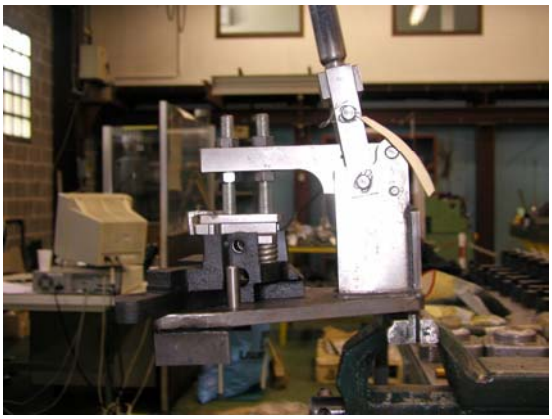
- Put the clamp in close position by pulling the handle;



Note : Align the axis holes of the rockers as well as the axis holes of the frame by knocking slightly with a hammer and looking through the axis hole from one side of the mechanism.

- Put the rocker axle.

- Push the toggle handle in open position and secure the rocker axis with the split pin.

The CNC is now ready to re-enter the production.

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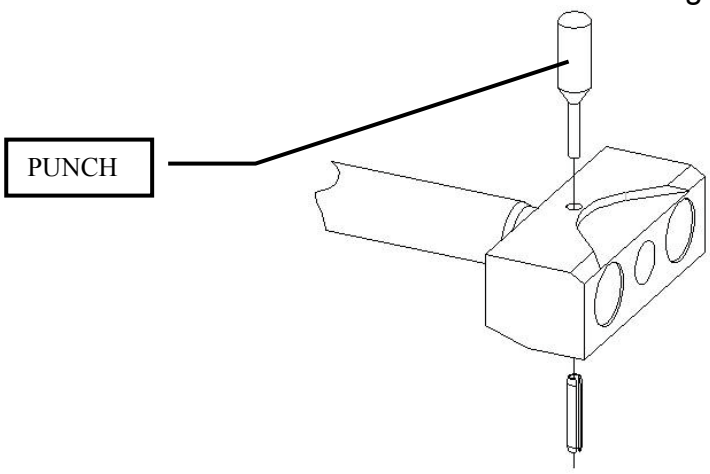
8.5 MAINTENANCE OF THE PLATE LOADER

8.5.1 DISASSEMBLING PROCEDURE FOR THE PLATE LOADER ASSEMBLY

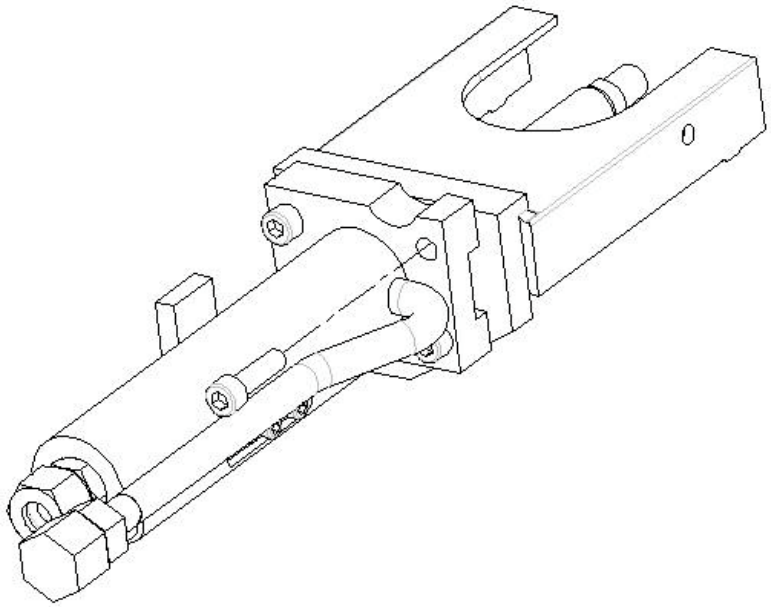
Every maintenance of the CNC should be coupled with the maintenance of the Plate Loader assembly.

The Rod must be fully out. Use a hydraulic unit to extract the Rod.

- Remove the 5mm Pin out of the Ram Head using a Punch



- Unscrew the Ram Head from the Cylinder Rod using a 19mm Spanner.
- Unscrew the 4 Socket Head Screws M10 on the Rear of the Cylinder Head.



- Detach the Cylinder Head from the Cylinder

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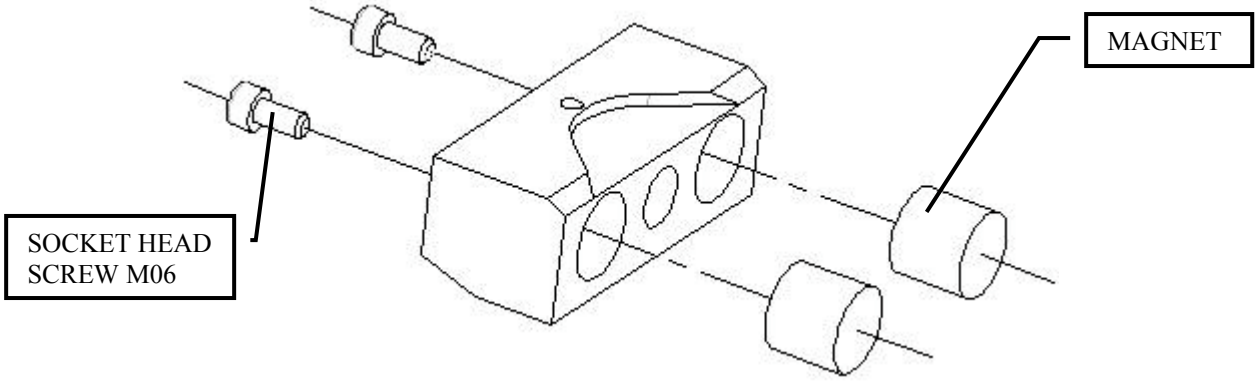
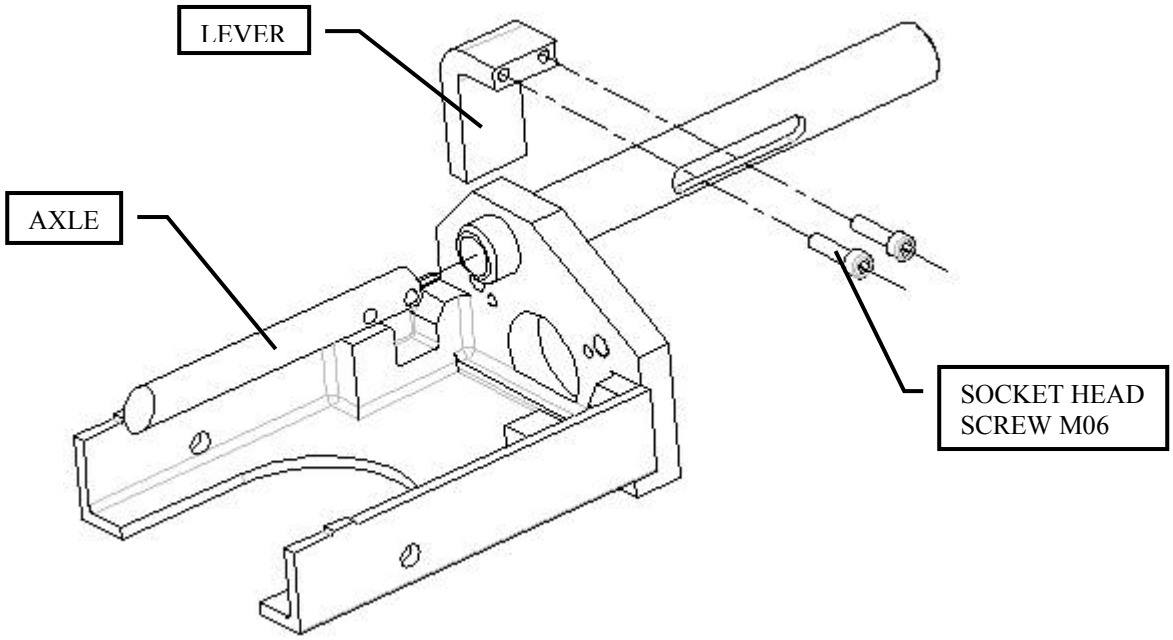
If damages are located on the magnets, remove the magnet from the clevis by unscrewing the Socket Head Screws M06 on the rear of the Ram Head.

Note: Keep the magnets free of any debris or metallic object



If damages are located on the trigger, disassemble it as shown on the sketch



Note : For the hydraulic unit, the hydraulic valve package and the accumulator, see the supplier manual for the routine maintenance.

8.5.2 INSPECTION

The hydraulic cylinder should be inspected for wear and tear.

Inspect and replace, if necessary, the seals, in case of leakage.

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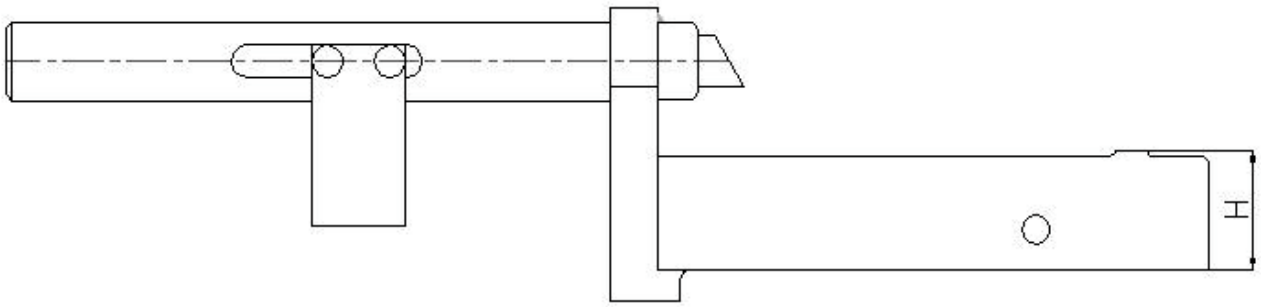
Inspect the cylinder barrel and rod for deformation or other physical damage.

Check the wear of the Plate Loader as follow:

- Measure the dimension "**H**" on each side of the Plate Loader, <u>if the dimension is lower than 37.3mm</u>, **it must be replaced**.

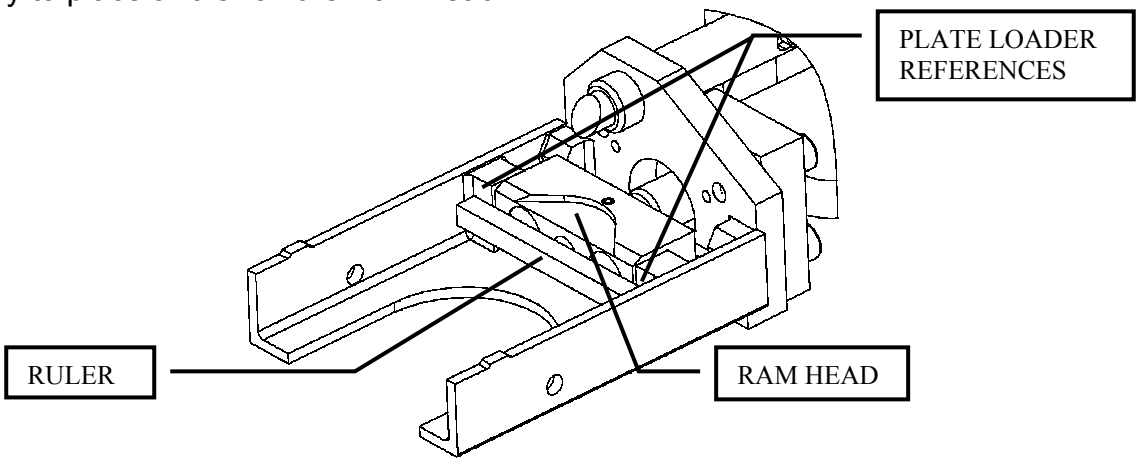


Eventually, the trigger mechanism can be recovered for a new Cylinder Head.

<u>8.5.3 PLATE LOADER ASSEMBLY</u>

When assembled, check the position of the Ram Head as follow.

Try to place a ruler on the Ram head.



- If it is possible :
  Place the ruler on the Ram head (piston rod fully in) and try to pass a feeler gauge of 1mm between the ruler and the Plate Loader on each side.
- If it is not possible:
  Place the ruler on the Plate Loader faces and try to pass a feeler gauge of 0.5mm between the ruler and the Ram Head.

If the feeler gauge can pas, the Plate Loader is not properly set and the Plate loader should be re-assembled.

<u>8.5.4 ASSEMBLING PROCEDURE</u>

Proceed from below to the top of the disassembling procedure.

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9 ENVIRONMENT ASPECTS

All scrap coming from the Tube Changer maintenance must be dropped in appropriate bin for further recycling or evacuation according to the country local environmental regulation.

The supplier recommendations for the solvents and greases used during maintenance should be followed regarding its use and elimination.

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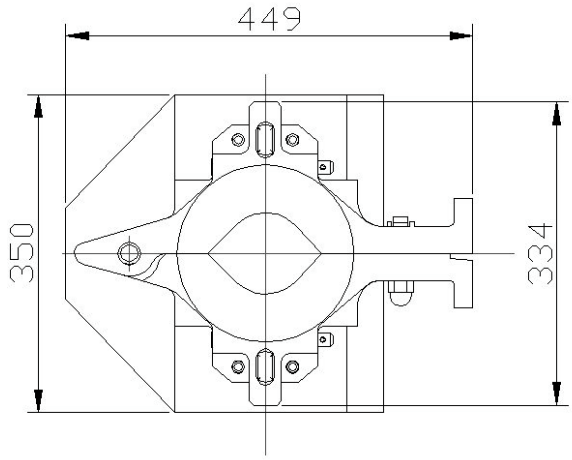
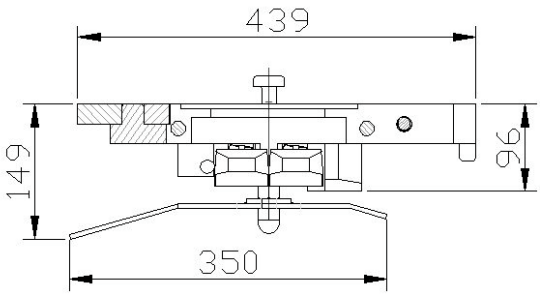
10 TECHNICAL SPECIFICATION SUMMARY

10.1 CNC DESIGN

Mechanical Technical Data





Total Weight with Refractories: 25.7 Kg

Refractory Technical Data

- Bore size	up to 20 mm
- Plate size	120 mm, square
- Top Plate Total Thickness	73 mm
- Slide Plate Total Thickness	54 mm
- Blank Plate Total Thickness	50 mm
- Effective Plates & Blank Working Thickness	30 mm
- Casing	Steel Can

10.2 PLATE LOADER (Hydraulic Cylinder)

- Plate Change average Time :	0.2 to 0.3 second
- Nominal Stroke	130 mm
- Rod Diameter	22 mm
- Total weight	less than 10kg

Recommended pressure to operate safely the gate (*)

	Cylinder Diameter	
	40	50
Nominal Pressure [bar]	210	160
Peak Flow [l/min]	50	77

Optional : Recommended Air cooling features for the Plate Loader (*)

Air Cooling	
Working Pressure [bar]	6
Minimum Flow [Nl/min]	500

(*) If this is not available, please contact your Vesuvius Local representative or the Customer Service (see 12.2 Customer Service).

10.3 Mechanism handling

All equipment can be handled manually.

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11 WARRANTY & CUSTOMER SERVICES

11.1 Warranty conditions

1. Vesuvius is not liable for defects arising out of materials provided, or a design stipulated or specified by the Customer.

2. Vesuvius is liable only for defects which appear under the conditions of operation provided for in the contract and under proper use of the Vesuvius Equipment.

3. Vesuvius liability does not cover defects which are caused by faulty maintenance, incorrect erection or faulty repair by the Customer, or by alterations carried out without Vesuvius written approval.

4. Vesuvius liability does not cover normal wear and tear or deterioration.

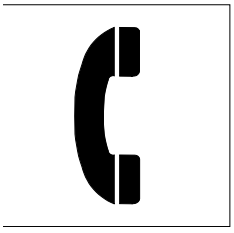
5. Warranty of Vesuvius is void when refractory components are used from other sources than Vesuvius and/or refractory components not being approved and/or licensed by Vesuvius

6. Vesuvius, as stipulated in the point 4 above, shall not be liable for defects. This applies to any loss the defect may cause including loss of production loss of profit and other indirect loss.

For further Details concerning these conditions, please refer to the adequate paragraphs in the Purchase Order document or in the contract.

11.2 Customer Service

For any question:



Call

- your local Vesuvius representative
- Vesuvius Systems Customer service:
  +32 65 / 400 810

VESUVIUS Local Representative card / stamp:

VESUVIUS SYSTEMS

Casting the future together

CNC

CALIBRATED NOZZLE CHANGER SYSTEM

USER MANUAL

VESUVIUS SYSTEMS

Date : December 2004

VESUVIUS applied rigid quality assurance and quality control procedure based on national and international standards. In line with the policy of continuous improvement, VESUVIUS reserves the right to modify in details, the equipment as described and specified in this document.
Patent pending.

VESUVIUS SYSTEMS

CNC

CALIBRATED NOZZLE CHANGER SYSTEM

USER MANUEL

Date : December 2004

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1. ВСТУПЛЕНИЕ

Информация, изложенная в данном Руководстве, предназначена для использования клиентом в качестве справочной в процессе создания программы обучения и инструкций для своих сотрудников. Любое использование этого материала в конкретных условиях различных предприятий должно основываться на экспертизе технических служб завода и определении пригодности для применения персоналом, компетентным в профессиональном отношении.

Вся информация, представленная здесь, основана на лучшей из располагаемой информации на момент опубликования. Данное предупреждение должно быть взято на заметку теми, кто использует это руководство, для сравнения информации с текущими средствами и методами обслуживания, с целью проверки точности информации. Кроме того, данное руководство должно изучаться вместе с документацией клиента, содержащей полную и подробную информацию об оборудовании, поставляемом фирмой «Везувиус».

Никакая лицензия в виде любого патента, торговых марок, ноу-хау или интересов, составляющих собственность фирмы «Везувий», не предоставляется и не подразумевается посредством предоставления данного Руководства.

Фирма «Везувиус» оставляет за собой право в любое время изменять и/или модернизировать свое оборудование или спецификации в соответствии с уровнем развития техники. Содержание Руководства, исходя из данного положения, также подпадает под возможность модификации.

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2. МЕРЫ БЕЗОПАСНОСТИ

Ремонт и обслуживание любого оборудования, работающего под давлением, должны производиться при снятом давлении.

Целиком и полностью следуйте Инструкциям и Руководству по эксплуатации, прилагаемым к оборудованию.

При обращении с тяжелыми грузами необходимо следовать правилам, установленными заводом. Применяемые устройства предназначены для подъема оборудования. Всегда используйте соответствующий инструмент и разрешенные погрузочно-разгрузочные механизмы для любого ремонта и обслуживания (обратитесь к Инструкции по ремонту и Руководству по эксплуатации, раздел 7.5).

Максимальная нагрузка на грузоподъемные механизмы, поставляемые фирмой «Везувий», должна соблюдаться.

Во время выполнения работ должны надеваться Индивидуальные Средства Защиты (ИСЗ): перчатки, очки, каска, защитные безопасные ботинки, рабочая одежда.

Использование любого вида оборудования, поставляемого фирмой «Везувий» или описанного в данной документации, в иных целях, кроме как определенных в описании, строго воспрещается.

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3. ОПИСАНИЕ ИЗДЕЛИЯ

3.1 CNC-механизм

CNC-механизм состоит из частей, показанных на рисунке. Главная особенность CNC-механизма – это то, что он собирается из двух частей (“мама” и “папа”), которые соединены вертикальной вращающейся осью. Эта специфическая особенность позволяет снимать механизм. Две части фиксируются друг с другом посредством одного Т-образного болта.

Рисунок 1 показывает общий вид механизма. Более детальная информация, включая список частей для заказа, находится в документации, которая поставляется с механизмом.

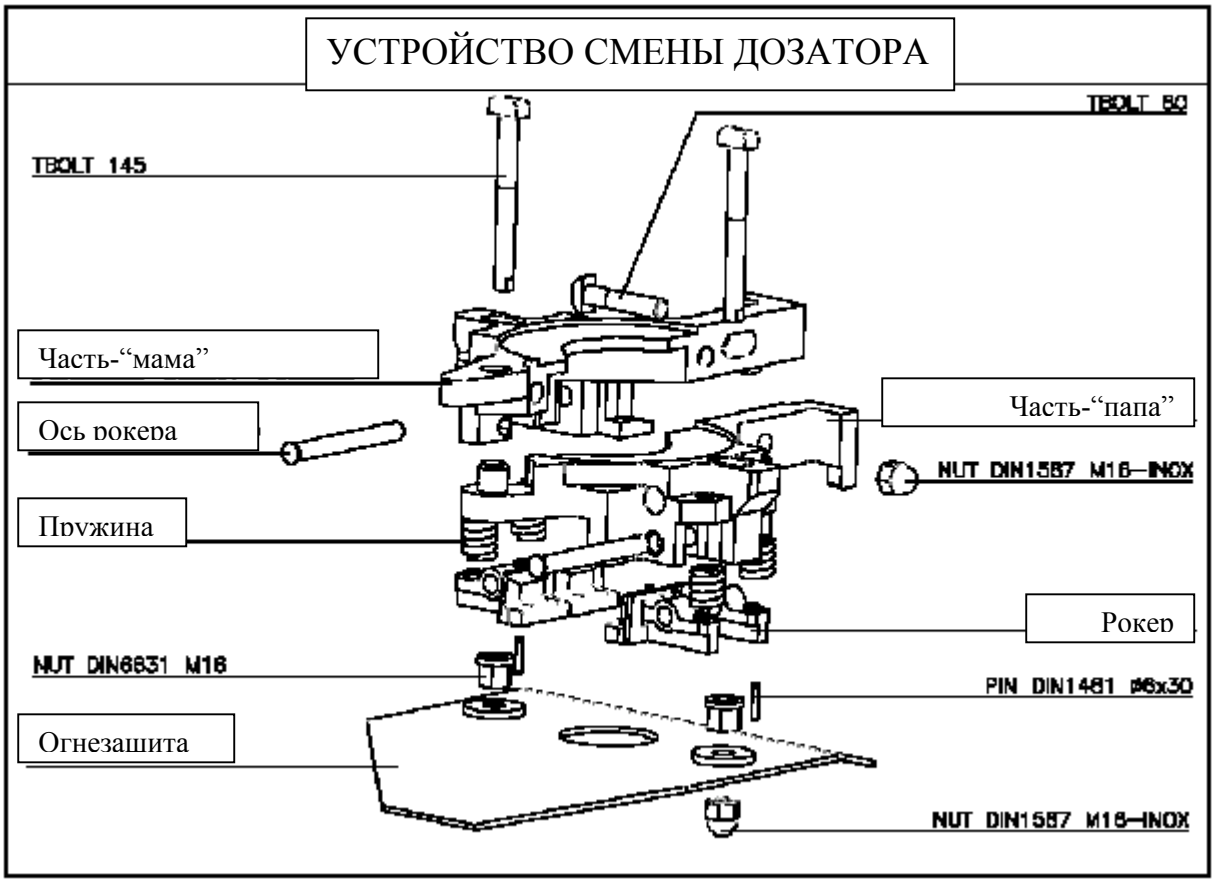

Fig. 1

Система подачи дозатора состоит из 4 пружин, действующих индивидуально на каждый рокер, которые закреплены на двух осях.

Каждая половина механизма хорошо защищена от брызг и температуры посредством огнезащиты из нержавеющей стали. Вдобавок фронтальная

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огнезащита защищает механизм со стороны подачи дозатора, когда цилиндр снят.

Механизм крепится к промковшу посредством двух Т-образных болтов, каждый на одну часть CNC-механизма. Т-образный болт также служит для фиксации огнезащиты к механизму и механизма к промковшу.

Гайки с колпачками поставляются для защиты резьбы болтов.

Механизм с огнеупорами может быть навешен без домкратов или других подъемных устройств одним оператором (см. главу 10). “Хвост” опорной балки приваривается на стороне части-“мама” механизма совместно со стальной опорой, приваренной на днище промковша, и позволяет легко удерживать механизм одной рукой, пока не будут зафиксированы Т-образные болты.

3.2 Механизм подачи дозатора

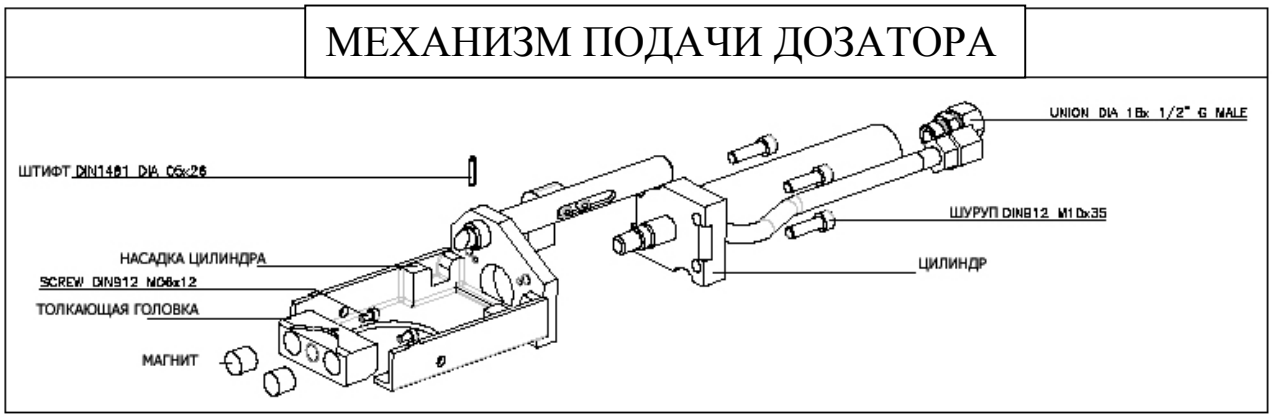

Fig. 2

Механизм подачи дозатора состоит из цилиндра двойного действия, оборудованного специальной насадкой для установки в нее нижнего дозатора или заглушки и закрывающее устройство (пружина, самозакрывающая система) для защиты цилиндра на механизме. Дозатор подается посредством толкающей головки, зафиксированной на штоке цилиндра.

Легкий вес конструкции позволяет легко навесить и закрепить ее вручную (см. часть 10.2).

Примечание: Для механизма рекомендуется невозгораемая жидкость (HFD или HFC).

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3.3 Гидравлические шланги

Fig. 3

Гидравлический шланг – шланга высокого давления, защищенная теплозащитной оболочкой. Шланг будет выбран в зависимости от жидкости и от установки заказчика.

3.4 Гидравлика

3.4.1 Гидростанция (общий вариант)

Это мобильная гидростанция включает в себя:

- 25-литровый бак;
- Насос 10л/мин (4kW);
- 5-литровый аккумулятор;
- Клапан для ручного управления;
- Регулятор потока.

Для более детальной информации обращайтесь к инструкциям для гидростанции.

Fig. 4

Коробка гидроклапанов

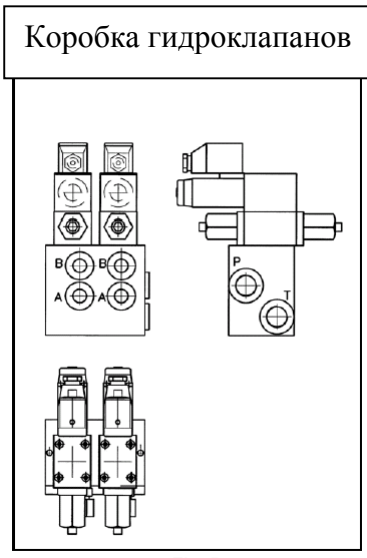

Fig. 5

3.4.2 Гидростанция (полный вариант)

Полная сборка включает в себя:

- Насос;
- Аккумулятор;
- Блок изоляционных клапанов;
- Коробка клапанов.

Для более детальной информации обращайтесь к инструкции для гидростанции.

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3.5 Огнеупоры

Рисунки показывают типовой ряд огнеупоров применяемых на CNC.

Огнеупоры фирмы Везувиус поставляются готовыми к использованию.

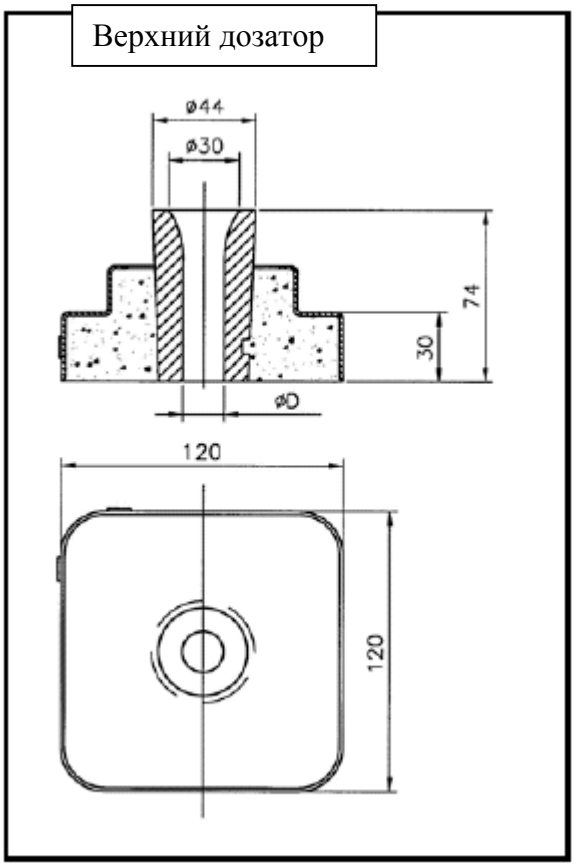

Fig. 6

3.5.1 Верхний дозатор

Верхний дозатор заканчивает несменяемую часть разливочного канала и рассчитан на всю серию.

Этот дозатор содержит циркониевый стакан высокой стойкости, который находится в высокоглиноземистой плите. Нижняя поверхность изготовлена так, чтоб гарантировать отличную плотность соединения с нижним дозатором. Дозатор заключен в стальной кожух, чтоб обеспечить хорошие механические свойства для точного и плотного соединения.

Глинозем также имеет функцию изоляции.

Верхний дозатор должен быть установлен в механизм так, чтоб картонные накладки находились со стороны подачи механизма. Так, когда 2 половины механизма закрыты, верхний дозатор будет автоматически прижат в нужную позицию относительно рамы давлением на накладку. Это очень простой способ избежать добавки механических направляющих устройств в CNC и защитить огнеупоры от неправильных напряжений.

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3.5.2 Нижний дозатор

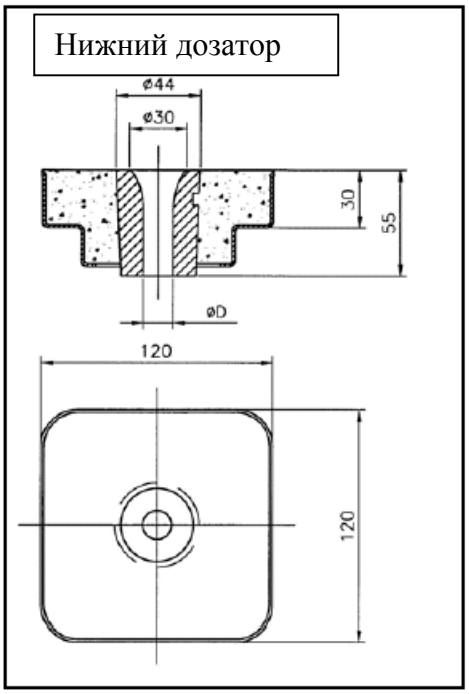

Fig. 7

Нижний дозатор выполнен с таким же стальным кожухом, как и верхний и состоит из калиброваного циркониевого стакана, вставленного в высокоглиноземистую плиту. Рабочая поверхность нижней плиты также обработана.
Отверстие нижнего дозатора должно быть всегда меньше отверстия верхнего дозатора.
Максимальный диаметр отверстия – 20мм.

3.5.3 Заглушка

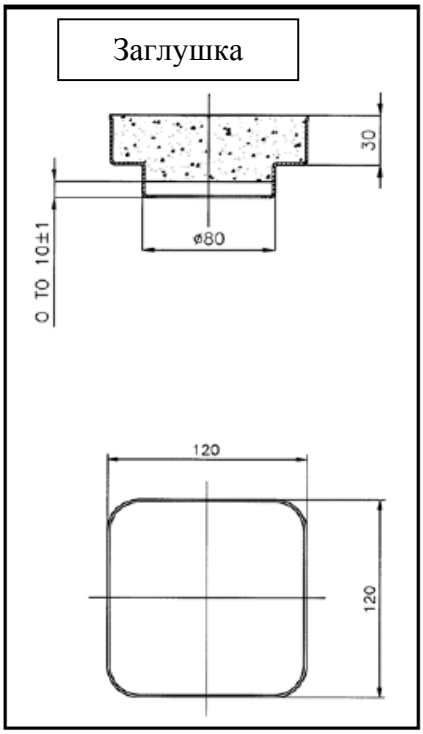

Fig. 8

Выполненная в таком же металлическом кожухе, как и верхний и нижний дозаторы, высокоглиноземистая плита позволяет перекрыть разливочный стакан в любое время в случае необходимости или в аварийных случаях.

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3.5.4 Прокладка из керамобумаги

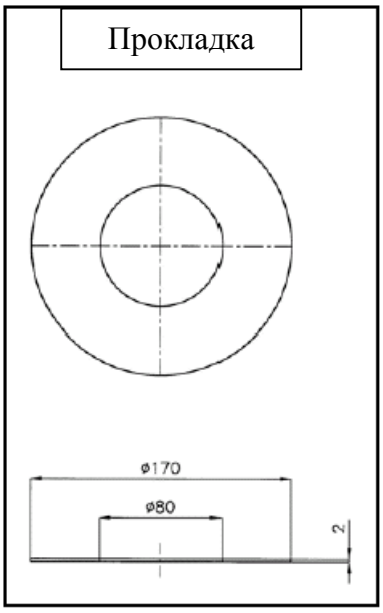

Fig. 9

2мм кольцо из керамобумаги ложится на механизм перед установкой на промковш. Это кольцо предотвращает припекание набивной массы к механизму и оборудованию.

3.5.5 Гнездовой блок

Рекомендуется изготавливать гнездовой блок из набивной массы после установки механизма на промковш. Для выдержки геометрии разливочного стакана используется металлический шаблон.

3.5.6 Пусковая труба

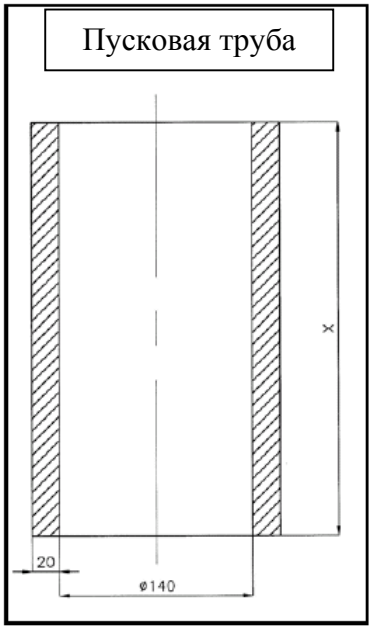

Fig. 10

Какой бы ни была технология пуска, мы рекомендуем использовать пусковую трубу, чтоб избежать проблем с холодной сталью и возможного попадания мусора в разливочный канал. Пусковая труба обычно представляет собой трубу, которая устанавливается в разливочный канал с помощью мертеля после торкретирования промковша.

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4. ОПЕРАЦИИ В ЗОНЕ ПОДГОТОВКИ ПРОМКОВША

Так как механизм легко транспортируется, он может собираться в любом месте. Мы предлагаем устанавливать механизм на промковш в зоне подготовки промковша и после этого набивать гнездовой блок. Во время сборки промковш должен находится в горизонтальном положении на стенде и при этом должен имеется доступ к каждому ручью. Механизм может быть снят на разливочной платформе после разливки или в любое другое время, когда есть доступ к днищу промковша.

4.1 Специальные инструменты

CNC-механизм специально спроектирован, чтоб обслуживать и ремонтировать его с минимальным количеством инструментов (Рисунок 12):

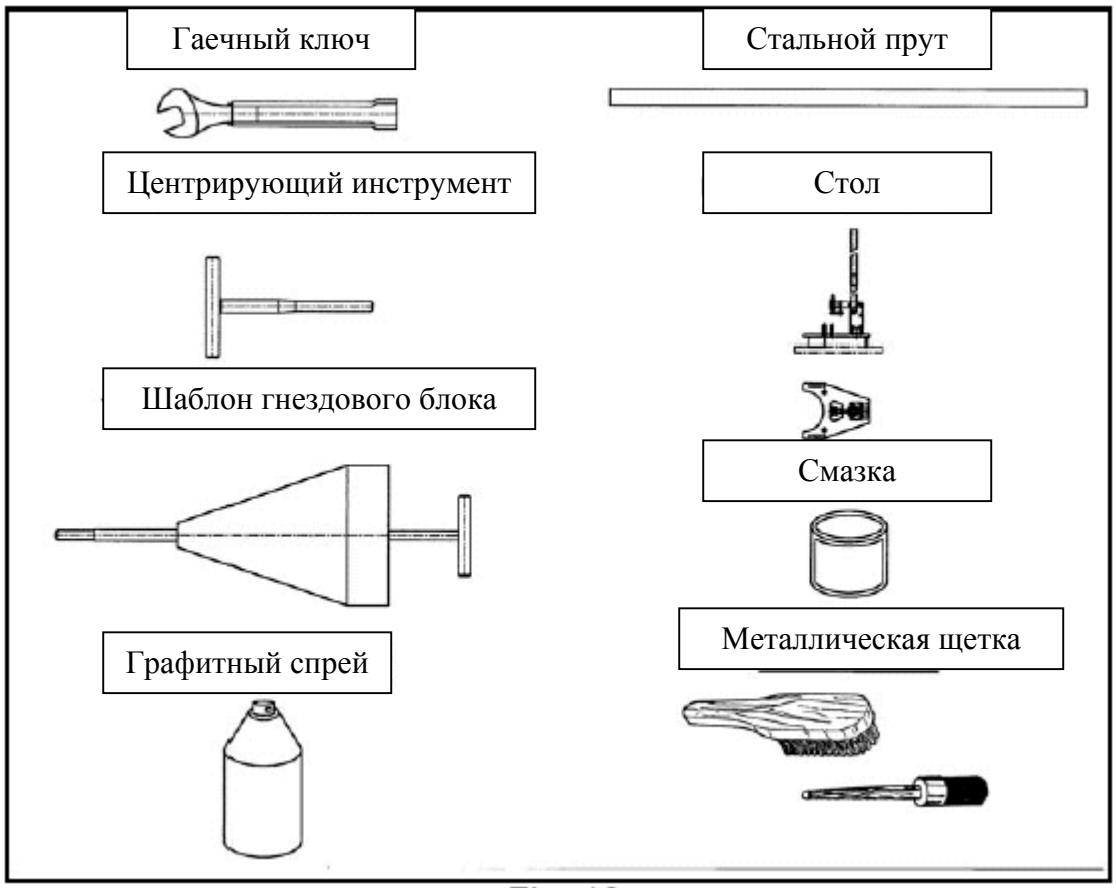

Fig. 12

- Ключей на 24 достаточно для облуживания механизма;
- Стальной прут (диаметр 20мм, длина 1м) для открытия и навески половин механизма;
- Центрирующий инструмент (диаметр берется для конкретных условий) для

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установки дозаторов во время сборки;

- Стол для выполнения обслуживания механизма;
- Металлический шаблон для набивки гнездового блока;
- Металлическая щетка для очистки деталей;
- Смазка и щетка (только высокотемпературная противосхватывающая смазка / рекомендуется Wolfracoat C);
- Графитный спрей.

Для обслуживания CNC требуется только один стол.

4.2 Описание устройства стола

Стол спроектирован для использования с CNC и для решения следующих задач:

- Установить огнеупоры на механизм;
- Собрать-разобрать механизм;

Стол в основном состоит из:

- Закрепленного на верстаке стола;
- Рычажного зажимного механизма, прикрученного к столу.

Рычажный зажим работает вручную и позволяет сжимать пружины одной половины механизма, поставленной на стол.

Фиксирующий палец на столе позволяет правильно установить половину механизма.

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4.3 Установка стола

Стол устанавливается на верстак в зоне подготовки промковшей (Рисунок 11).

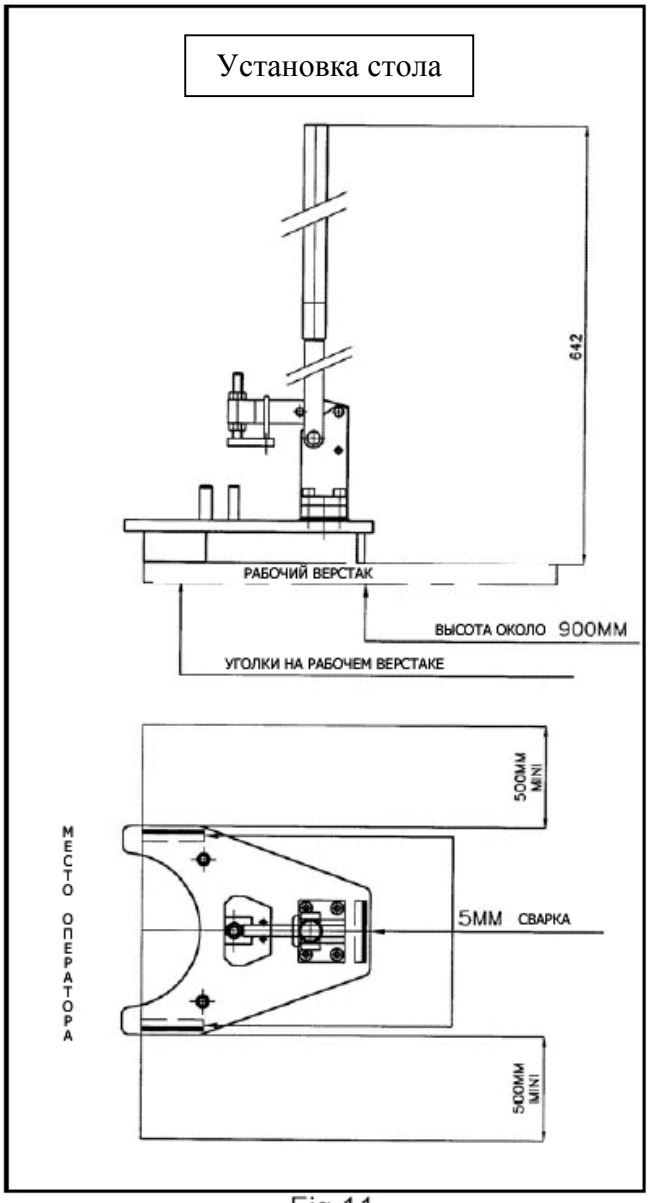

Fig.11

Найдите место, где есть достаточно пространства спереди и по бокам стола, чтоб можно было легко устанавливать механизм и работать с рычажным зажимом.

Два уголка должны быть приварены по краям верстака на одном уровне.

Приварите 3 уголка на верстак 5-мм сваркой под стол.

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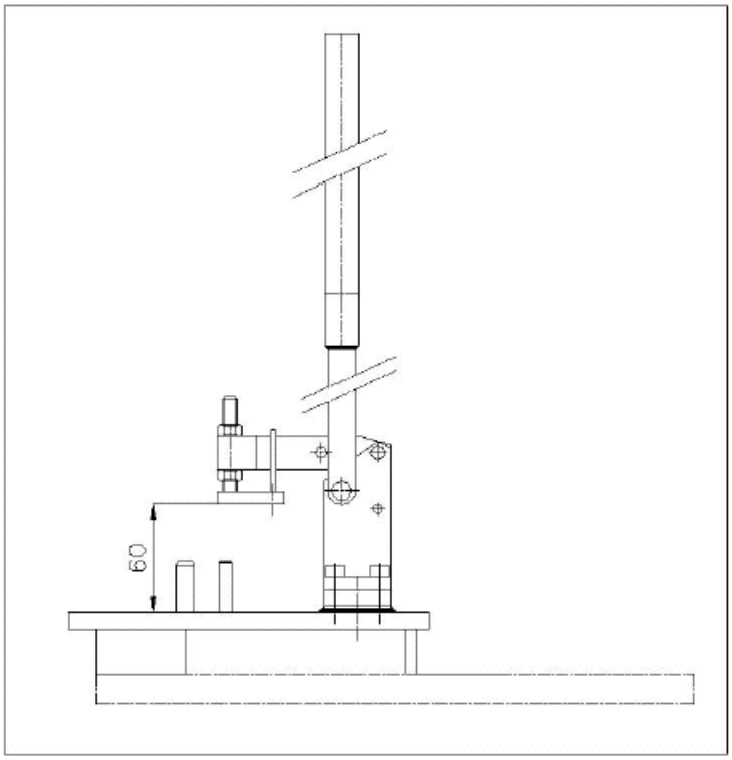
4.4 Настройка оборудования зоны подготовки промковша

- Поставьте рукоятку зажима в вертикальное положение;
- Ослабьте 2 гайки на прижимной головке рычага и выставьте расстояние между столом и головкой 60мм, накручивая сначала верхнюю гайку. Зафиксируйте позицию закрутив нижнюю гайку;



- Нажмите рукоятку рычага, чтоб открыть зажим;
- Установите одну часть механизма (Т-образный болт должен быть снят) на фиксационные пальцы на столе (центральный палец должен войти в отверстие в механизме для Т-образного болта);
- Поставьте рукоятку рычага зажима в вертикальное положение, ослабьте на 2 оборота верхнюю гайку и затягивайте медленно нижнюю гайку, пытаясь двигать ось рокера другой рукой. Правильная настройка достигается, когда ось рокера свободно двигается;
- Затяните обе гайки и проверьте, чтоб настройка не сбилась;
- Проверьте, чтоб ось рокера была свободна и на второй части механизма, установленного на рычажный зажим.

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5. ИЗМЕНЕНИЕ ПРОМКОВША

5.1 Описание

Изменение промковша (Рисунок 13) для каждого ручья сведено к минимуму и включает в себя:

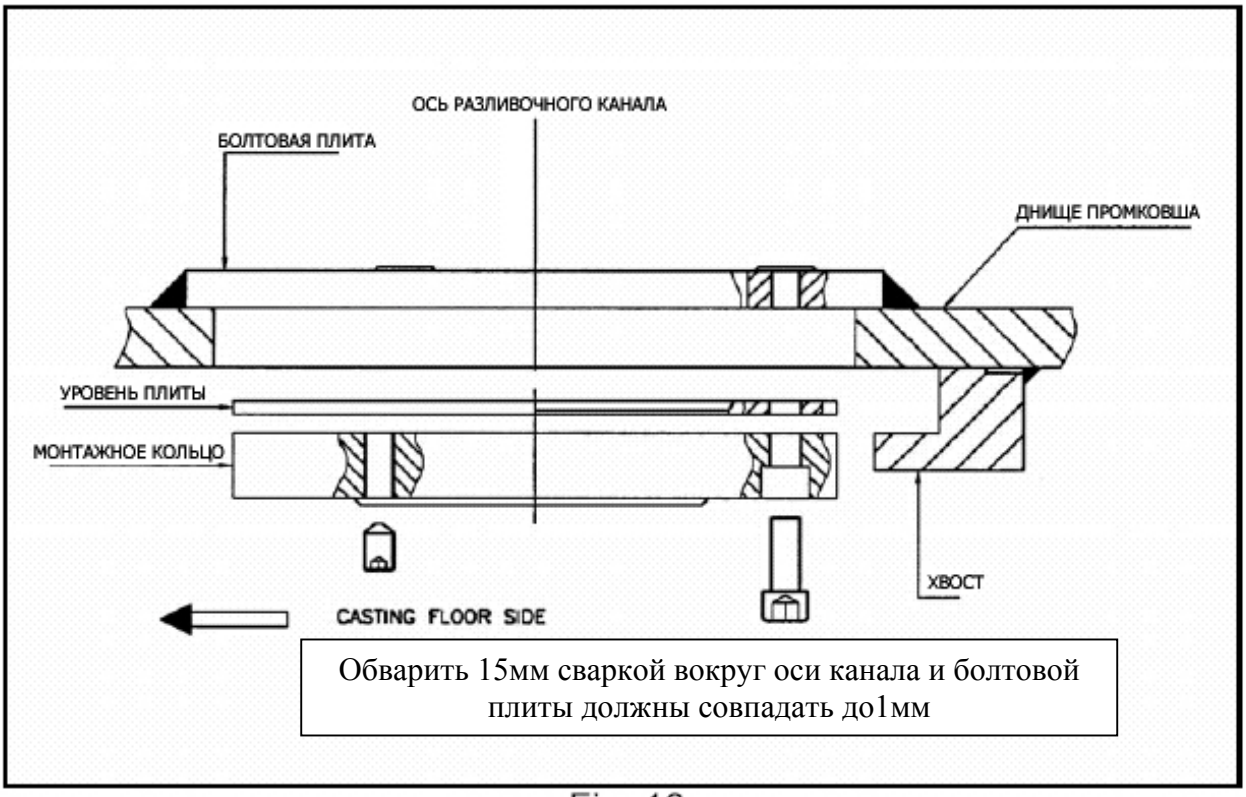

Fig. 13

- Болтовая плита приваренная изнутри к днищу промковша;
- Монтажное кольцо, прикрепленное к болтовой плите посредством 3-х гексаганальных шурупов. 3 гексаганальных шурупа также находятся и в монтажном кольце и позволяют выставить уровень монтажного кольца в любой момент и в любом положении. Так, ровность и последующие искривления днища промковша не столь критические и могут быть легко компенсированы.

Монтажное кольцо имеет отверстия и центрирующее кольцо для установки

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механизма.
Монтажное кольцо устанавливается внутри брони промковша. Только несколько миллиметров выступает за бронь промковша; поэтому эта часть не подвержена разрушению и длина разливочного канала была снижена.

- Уровневая плита из нержавеющей стали, вставленная между болтовой плитой и монтажной плитой и служит для нескольких целей:

  - ❖ Адаптация к толщине днища промковша;
  - ❖ Теплоизоляция монтажного кольца и механизма;
  - ❖ Защита гнезд Т-образных болтов от пыли и мертеля при ремонте футеровки промковша.

- “Хвост” опорной балки приваривается на днище промковша и имеет следующие назначения:

  - ❖ Помочь оператору во время установки механизма;
  - ❖ Защитить монтажное кольцо при установке промковша на пол.

5.2 Установка CNC-механизма на промковш

Центрирующий инструмент используется при установке и сварке болтовой плиты внутри промковша, как показано на рисунке 14.

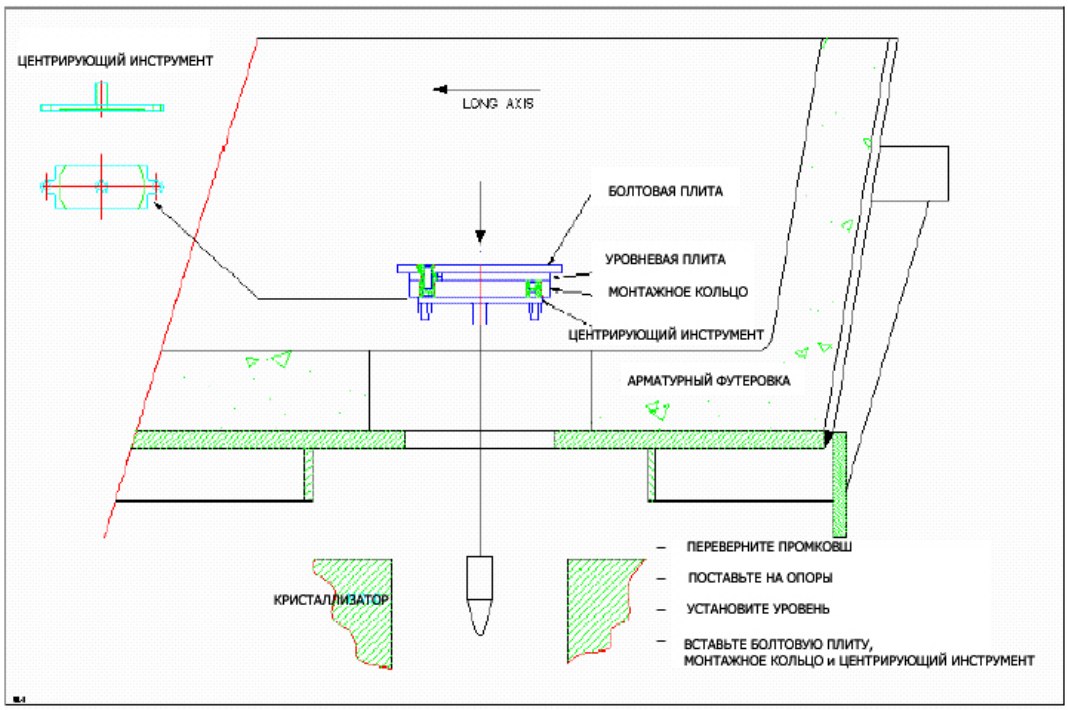

Fig. 14

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6. ГИДРАВЛИКА

6.1 Установка гидравлики и электрики

Мы рекомендуем установку и аккумуляторного изоляционного клапанного блока и клапанной коробки на тележку промковша.
Рекомендуется использовать невозгораемую гидравлическую жидкость (HFC, HFD).

6.2 Электрика

Несколько элементов электрооборудования должно быть установлено для контроля клапанной коробки и изоляционного блока клапанов:

- Панель оператора на разливочной площадке для выбора рабочей тележки промковша.
- Пульт управления и ламповая сигнализация. Они могут быть интегрированы в существующую панель управления ручьем.
- Контрольный шкаф, установленный в щитовой. Этот шкаф должен иметь логические схемы контроля выбора тележек, изоляционного блока, управления соленоидами клапанов. Щит контролирует также состояние гидравлики и электрики.
- Кабельное соединение между панелью управления, контрольным щитом и клапанами на двух тележках промковша.

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7. ТЕХНОЛОГИЯ РАБОТЫ С CNC-МЕХАНИЗМОМ

Предварительная подготовка огнеупоров в механизме:

- ❖ Зачистите поверхность 2-х главных рам, чтоб удалить остатки старой прокладки;
- ❖ Очистите и смажьте ось вращения главной рамы-“папа” посредством высокотемпературной антисхватывающейся смазки (Wolfracoat C).

7.1 Установка огнеупоров в механизм

- Установите часть механизма-“папа” без Т-образного болта на стол с зажимом, откройте и поднимите рукоятку зажима в вертикальное положение (самозакрывающаяся позиция).

- Поставьте верхний дозатор и нижний дозатор вместе, верхний дозатор внизу. Плиты ставятся под углом 45º друг к другу. Удостоверьтесь, что 2 красных картонных накладки на верхнем дозаторе находятся со стороны цилиндра и что отверстия верхнего и нижнего дозатора совпадают.

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- Сбросьте давление с пружин, установив рукоятку зажима в открытую позицию.
- Уберите часть-“папа” со стола на верстак (с осторожностью, чтоб не повредить огнеупоры).
- Установите часть-“мама” на стол и переместите рукоятку зажима в вертикальное положение (самозакрывающаяся позиция).
- Возьмите уже собранную часть-“папа” и зацепите ее за шарнир части-“мама”.

- Поверните часть-“папа”, чтоб закрыть механизм.
- Зафиксируйте 2 части вместе с помощью болта (каждый раз очищайте и смазывайте с помощью смазки Wolfracoat C).
- Сбросьте давление пружин на части-“мама”, постановкой рукоятки зажима в открытое положение.
- Снимите собранный механизм со стола и положите в другое место, осторожно, не допуская повреждения огнеупоров.
- Закрутите 2 Т-образных болта (каждый раз чистите и смазывайте их смазкой Wolfracoat C).

После этого механизм готов к установке на промковш.

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7.2 Установка механизма

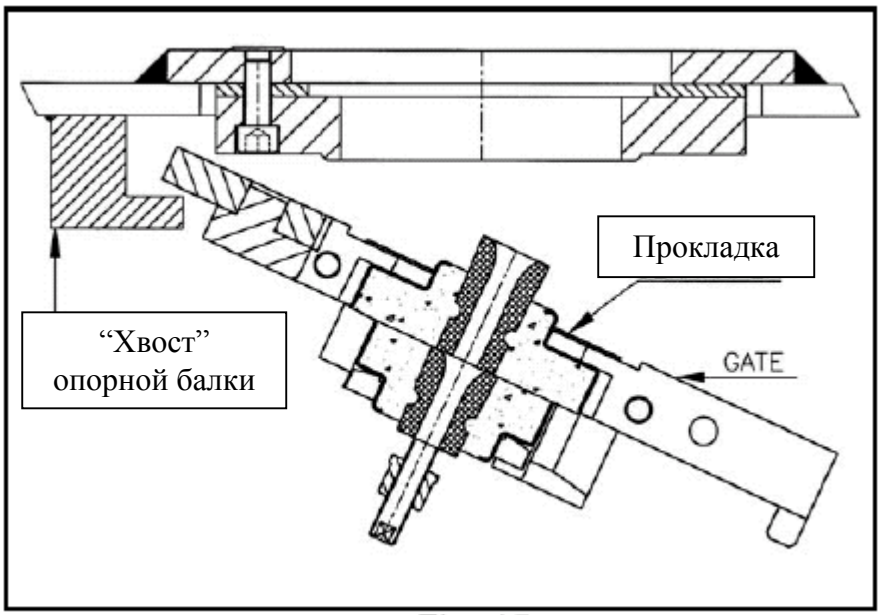

Fig. 15

- Проверьте, чтоб Т-образные болты были достаточно раскручены;
- Проверьте, чтоб вставка верхнего дозатора не была повреждена;
- Положите прокладку на верх механизма;
- Поднимите механизм с верхним дозатором и вставьте хвост механизма на "хвост" опорной балки промковша.

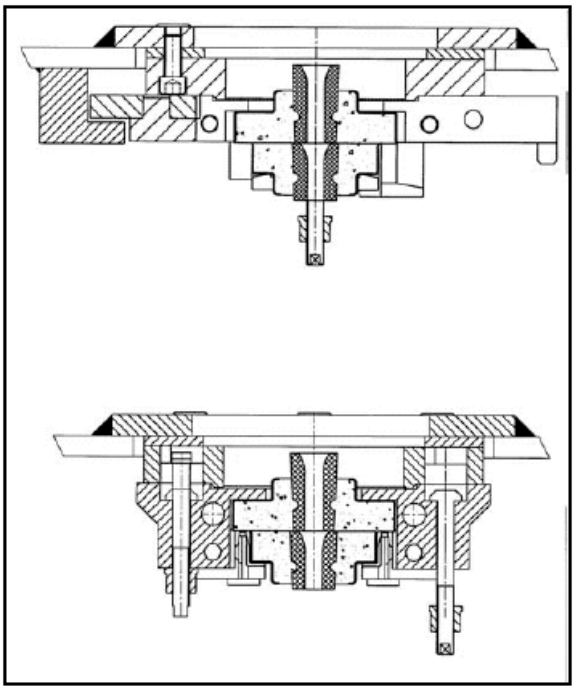

Fig. 16

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- Одной рукой придерживая входную часть механизма, поднимите механизм к монтажному кольцу;

- Другой рукой прижмите один из двух Т-образных болтов в слот монтажного кольца, проверните его на четверть оборота, чтоб зафиксировать и затяните болт. После этого, если отпустить механизм, головка болта должна быть параллельна оси механизма. Механизм в таком положении прикреплен к промковшу и может быть отпущен;

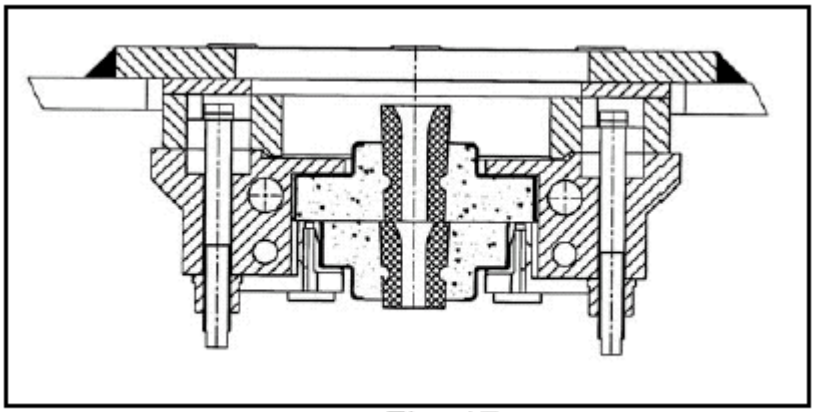

Fig. 17

- Втолкните другой Т-образный болт в слот и затяните его вручную;

- Закрутите гайки Т-образных болтов;

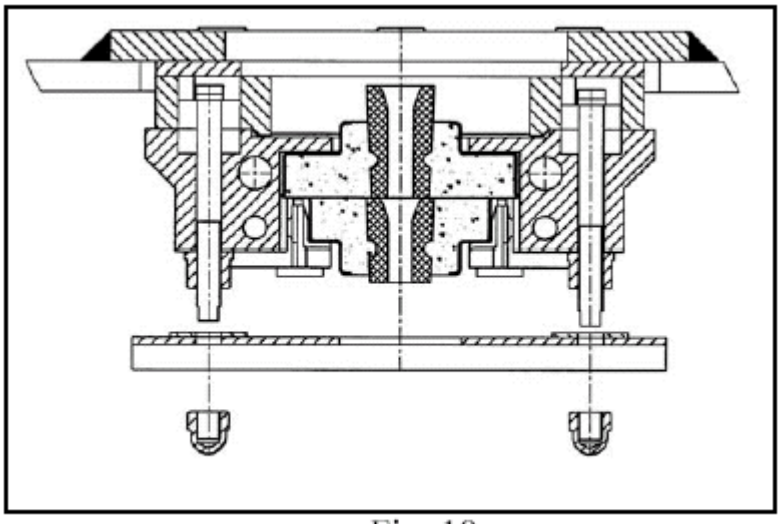

Fig. 18

- Возьмите огнезащиту и закрутите 2-е гайки с колпачками на каждый Т-образный болт для защиты от брызг.

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7.3 Работы в промковше

- Установите шаблон гнездового блока.
- Набейте гнездовой блок.

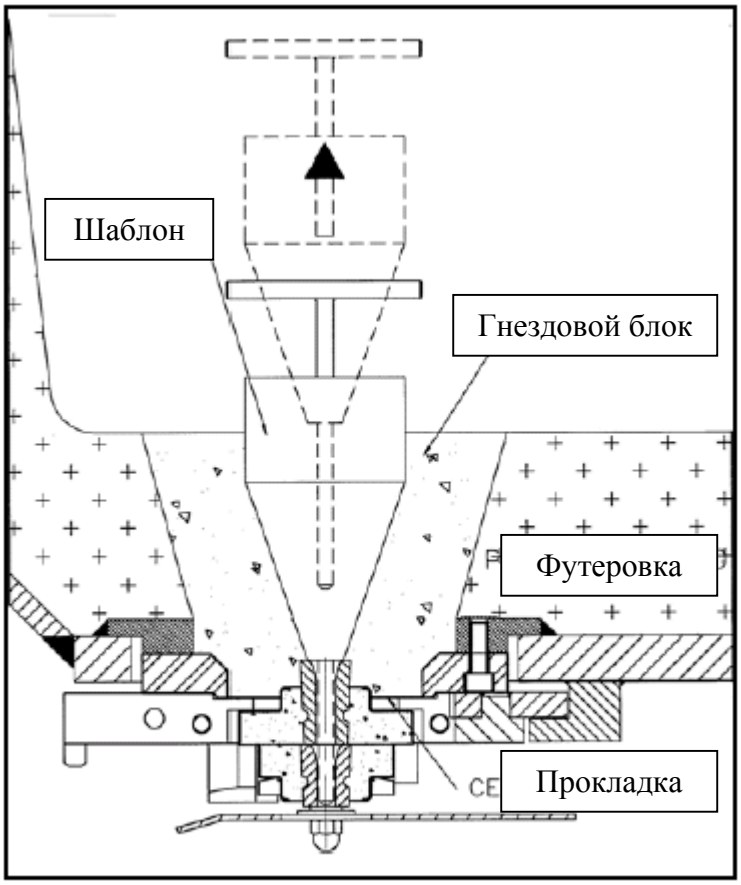

Fig. 19

- Удалите шаблон.
- Накройте отверстие специальной заглушкой.
- Заторкретируйте рабочий слой, как обычно.

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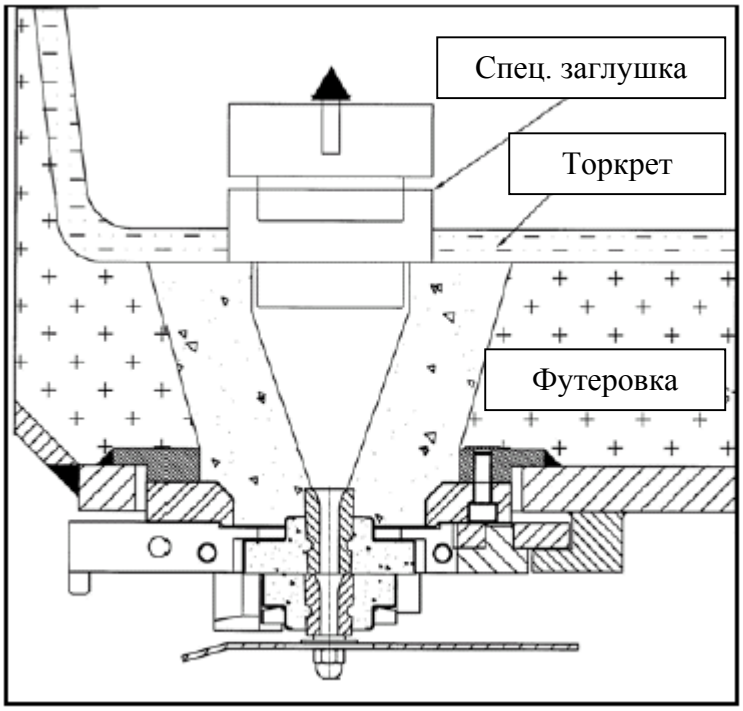

Fig. 20

Примечание: Внешний диаметр специальной заглушки равен внешнему диаметру пусковой трубы.

- Удалите специальную заглушку.

Существуют и другие методы установки, в зависимости от технологии завода-заказчика.

7.4 Разогрев

Промковш разогревается как обычно. Стандартная технология разогрева – сверху. Во время разогрева, установите фронтальную огнезащиту на механизм.

7.4.1 Открытая струя

Установите хромит и гере для каждого ручья.

7.4.2 Защищенная струя

- Установите пусковую трубу;
- Вставьте погружную трубу и специальный средний дозатор. Специальный средний дозатор имеет больший диаметр (40), чтоб получить достаточную теплопередачу к трубе.

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После одного часа, типичная температура трубы должна быть 1000ºC. Если необходимо, каждый ручей должен быть оборудован системой Вентури.

7.5 Смена дозатора

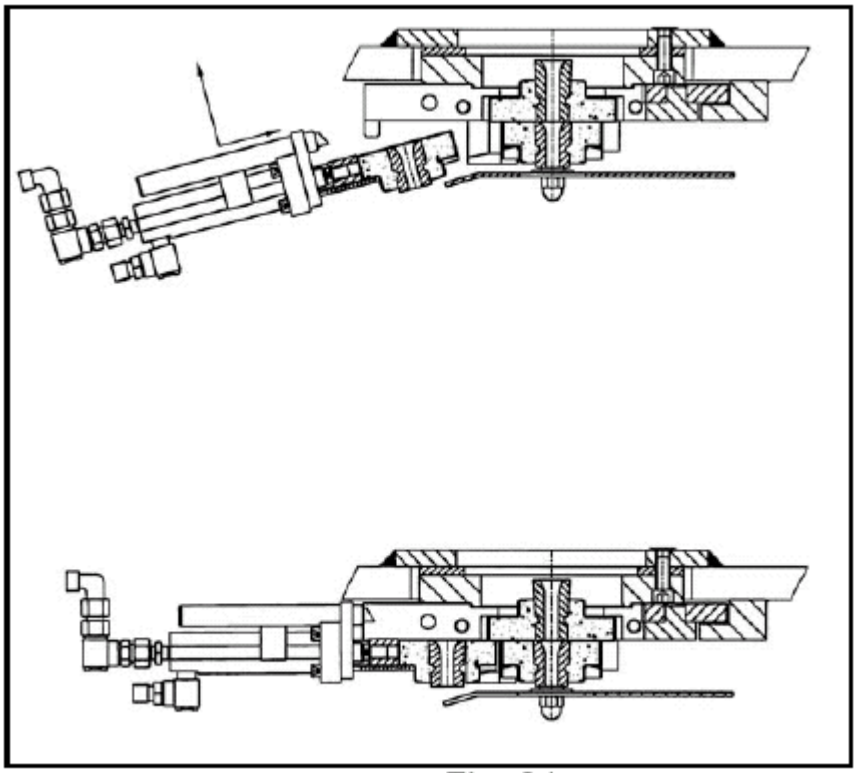

Fig. 21

- Проверьте, чтоб гидростанция была включена;
- Вложите новый дозатор в насадку цилиндра и переместите к ручью, на котором необходимо заменить дозатор;
- Снимите фронтальную огнезащиту с механизма (если она используется);
- Вставьте насадку цилиндра в механизм в направляющие;
- Поднимите цилиндр в горизонтальное положение к раме механизма до момента сцепки и проверьте, чтоб цилиндр был хорошо зафиксирован, подергав цилиндр вверх-вниз;
- Подойдите к ручному клапану на гидростанции.

Внимание: Для безопасности, запрещается касаться цилиндра при манипулировании клапаном.

- Приведите в действие клапан. Держите ручку клапана активированной одну секунду, как минимум, чтоб удостовериться, что смена выполнена (ручным клапаном);

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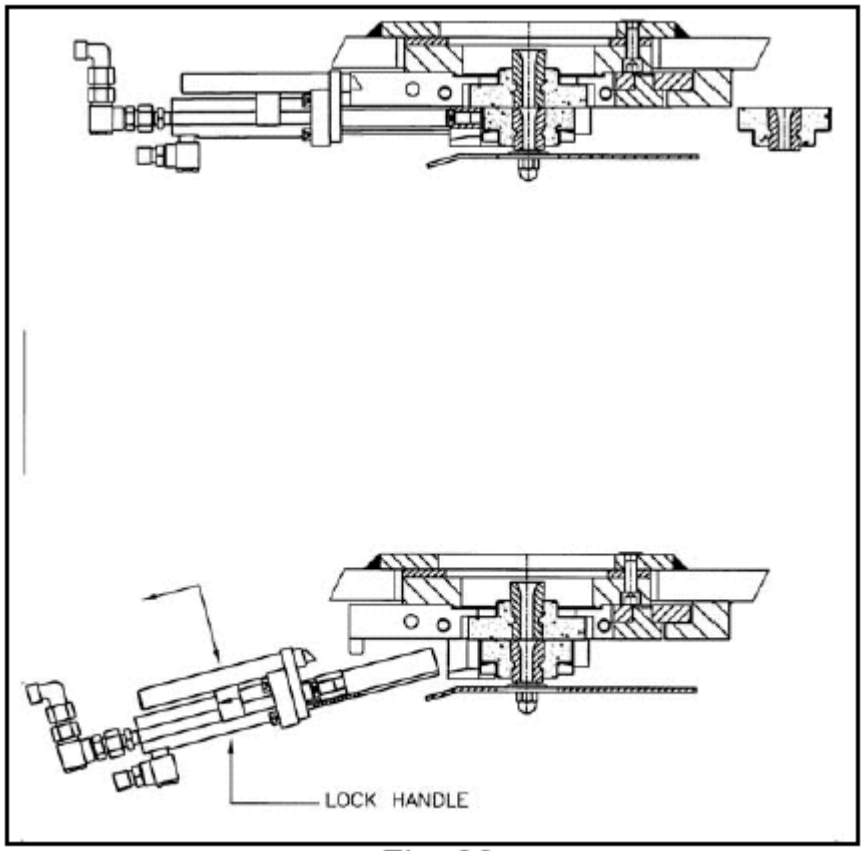

Fig. 22

- Отцепите цилиндр, надавив на рукоятку;

Если используется базовый вариант гидравлики (мобильная гидростанция см. главу 3.4):

- Снимите цилиндр и установите сразу фронтальную огнезащиту (только если цилиндр не стационарный);
- Поместите цилиндр и шланг в место хранения (только если цилиндр не стационарный).

Если используется полный вариант гидравлики (коробка клапанов см. главу 3.4):

- Снимите цилиндр;
- Вставьте заглушку;
- Установите цилиндр обратно на CNC.

Примечание: Рекомендуется держать заглушку всегда в CNC, что позволяет перекрыть ручей в любое время или в аварийном случае.

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7.6 Окончание разливки

Обычно разливка заканчивается перекрытием заглушек на каждом ручье. Механизм должен быть снят перед удалением козла.

Снятие механизмов с промковша выполняется в любом месте, где есть доступ к механизму под промковшом.

После окончания разливки, дайте минимум 10 минут для замерзания стали внутри канала перед съемом механизмов с промковша.

- Снимите гайки с Т-образных болтов;
- Снимите огнезащиту;
- Вставьте 20 мм стальной прут в часть-“папа”;
- Ослабьте 2 части механизма, раскрутив гайки Т-образного болта, повернув его на 90º и высунув его;
- Ослабьте гайку Т-образного болта на части-“папа” (с левой стороны, если смотреть спереди на механизм) и поверните Т-образный болт и высуньте оба болта;
- Откройте часть-“папа”, давя прут наружу. Эта часть будет отделена от огнеупоров и от части-“мама”.
-

Примечание: 25мм отверстие в каждой половине позволяет открыть механизм и снять горячие части.

Под механизм должен быть установлен ящик с песком или нечто подобное, чтоб избежать падения частей CNC и их повреждений.

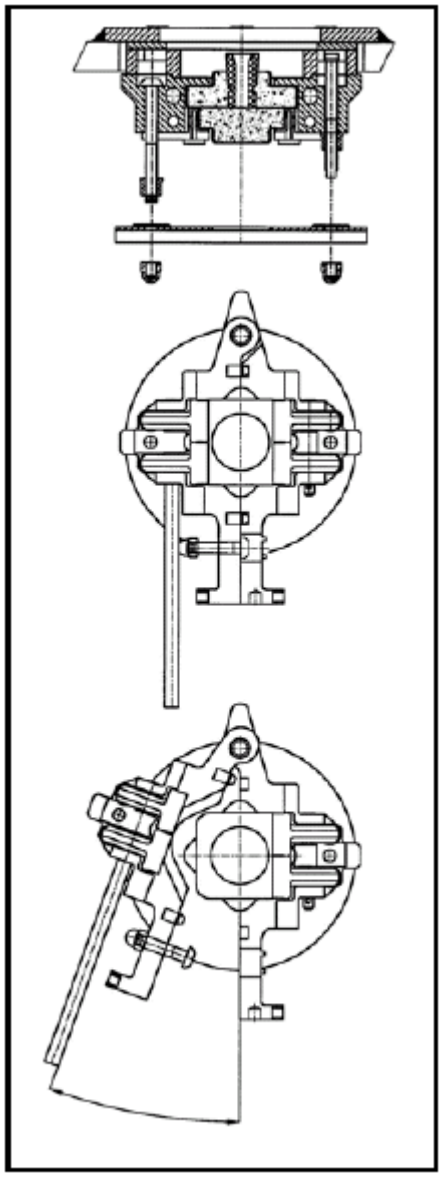

Fig. 23

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- Ослабьте гайку Т-образного болта на части-“мама”, поверните его и снимите. Часть-“мама” не упадет, так как она зацеплена за верхний дозатор.

- Вставьте прут в отверстие части-“мама”.

- Потяните часть-“мама” от огнеупоров.

Промковш готов к удалению козла и верхний дозатор, который приварен к козлу, может свободно пройти через отверстие в монтажном кольце.

После этого механизм сразу готов к установке новых огнеупоров и подаче в производство на другой промковш.

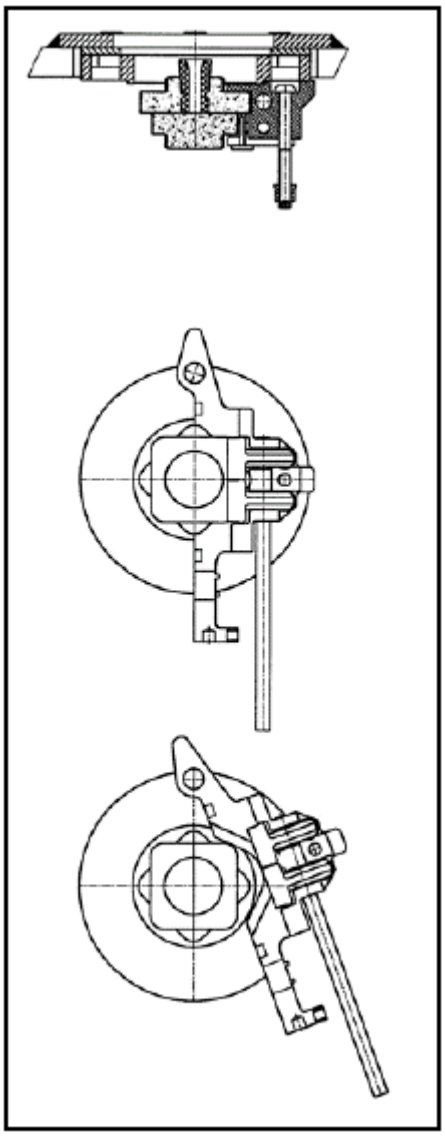

Fig. 24

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8. ПРОЦЕДУРА ОБСЛУЖИВАНИЯ

После 50 серий, механизм должен быть полностью разобран и проинспектирован.

8.1 Инструменты для обслуживания

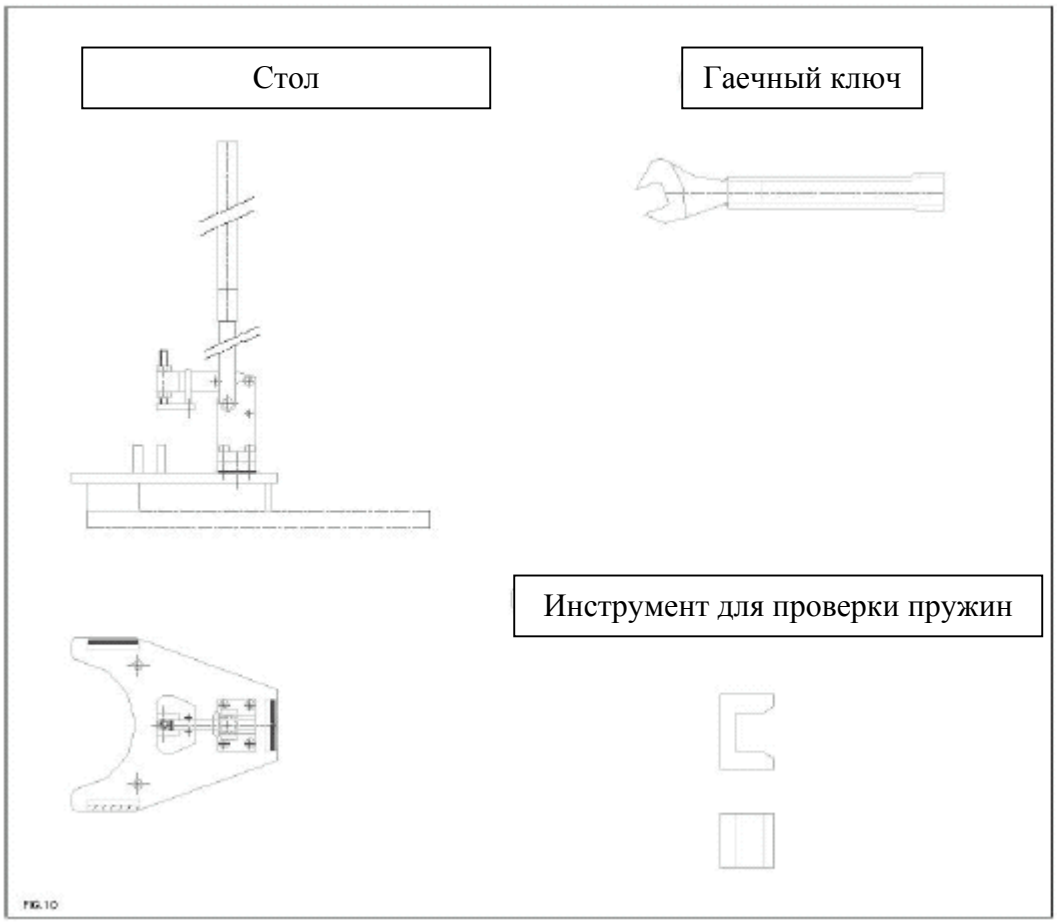

Fig. 25

Для обслуживания механизма необходимы такие же ключи и стол, как и для рабочих операций.

Проверочный прибор для пружин – это простой шаблон для контроля износа пружин.

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8.2 Разборка CNC-механизма

Для обеих частей механизма технология разборки одинакова.

- Снимите огнеупоры с механизма.
- Установите одну часть CNC на стол (без Т-образного болта).

- Снимите шплинт с оси рокера.

- Поставьте зажим в закрытую позицию с помощью рукоятки.

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- Вытащите ось рокера из механизма.

- Поставьте зажим в открытую позицию, нажатием рукоятки.

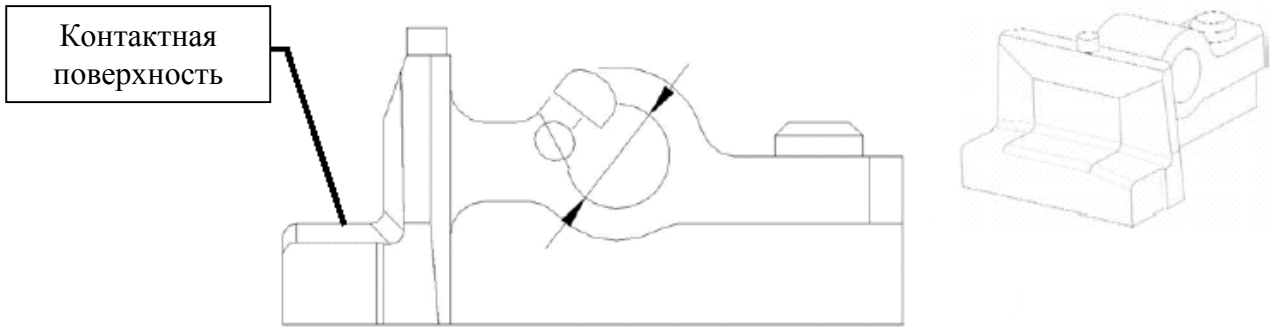
Два рокера и две пружины сейчас свободны для удаления из механизма для проверки или замены.

- Очистите каждую часть и тщательно проверьте на деформацию и износ (см. главу 8.3).

8.3 Инспектирование CNC-механизма

8.3.1 Инспектирование рокеров

- Тщательно очистите рокер перед любым тестированием.
- Если есть ненормальный износ на контактной поверхности рокера или на поверхности отверстия, рокер необходимо заменить.



- Используйте микрометр для измерения диаметра D. Он должен быть не больше, чем 15,95мм.

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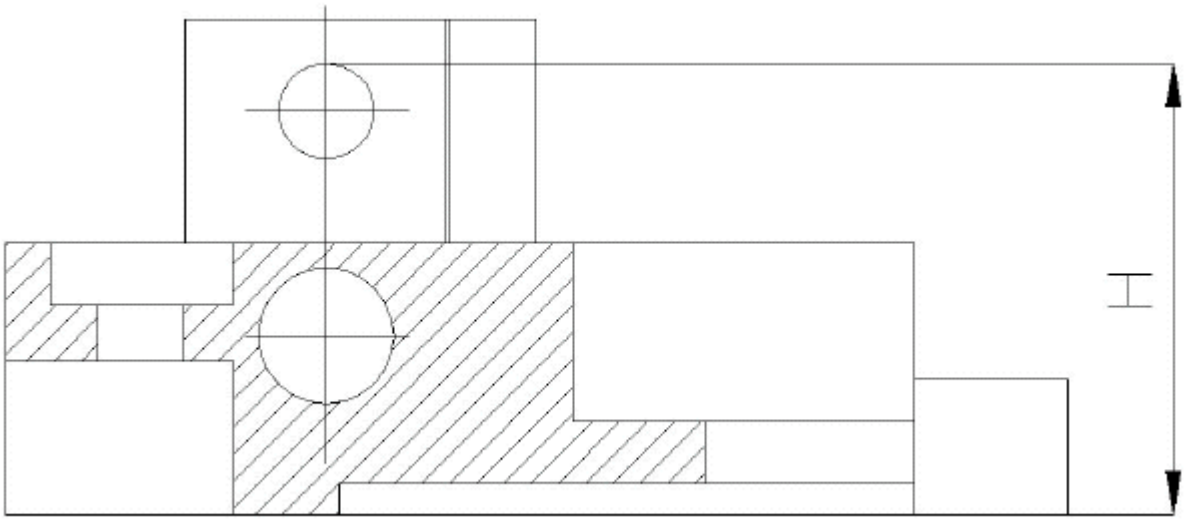
8.3.2 Главная рама

- Очистите части-“папа” и –“мама”от стальных брызг, пыли и т.д. и проинспектируйте повреждения.
- Проверьте плоскостность рамы, используя 200мм линейку. Если возможно всуньте 0,6мм щуп под линейку; если проходит – бракуйте эту часть рамы.
- Измерьте размер H между указанной поверхностью и верхом отверстия, в котором устанавливается ось рокера, как показано на чертеже. Если размер больше чем 73,50мм, он должен быть отбракован.



- Измерьте размер M между центром отверстия и поверхностью рамы, как показано на чертеже внизу.

Размер M должен быть между 209,5 и 210,5мм, в противном случае замените раму на новую.

- Измерьте толщину N “зуба” рамы, как показано на чертеже внизу.

Размер N должен быть между 18 и 19мм, в противном случае замените раму на новую.

- При открытии CNC-механизма, две рамы не должны быть повреждены. Если не возможно закрыть 2 части, инспектируйте их дальше, чтоб определить и устранить лишние точки контакта.

- Когда две части CNC-механизма скреплены вместе, проверьте наружный размер L, где крепится механизм подачи дозатора (см. чертеж внизу).

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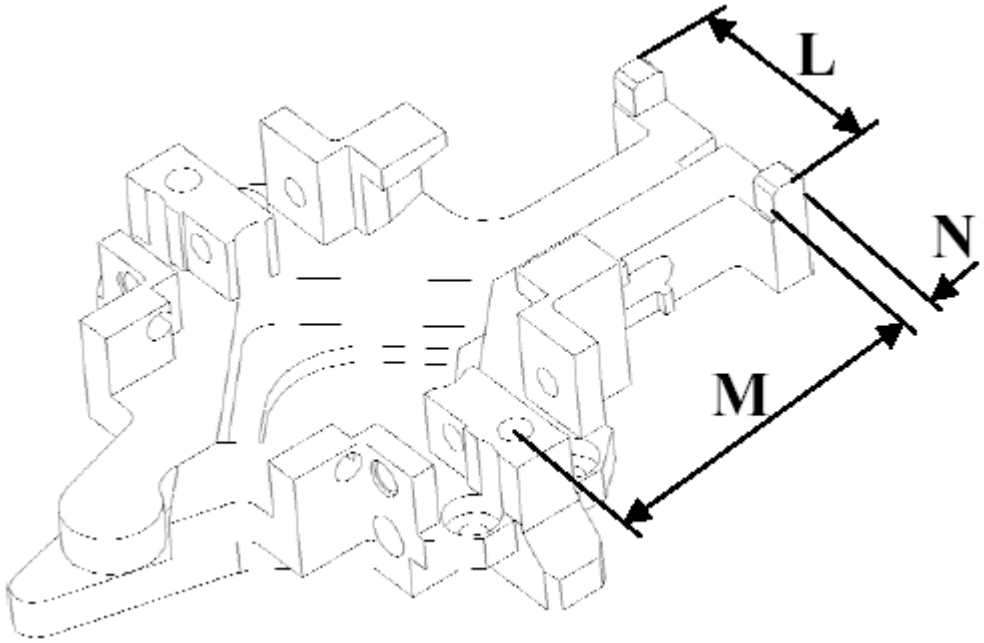

Напряжения и повреждения могут изменить геометрию частей CNC-механизма. Они не должны быть больше чем 120,5мм.
Если механизмы больше чем 120,5мм, это значит что две рамы CNC плохо подходят друг к другу. Обе части механизма должны быть разъединены и проинспектированы, чтоб определить и удалить любые брызги и посторонние предметы или острые края, которые вызывают различия в размерах.

- Если чрезмерный износ обнаружится на раме или рокере, свяжитесь с представителем фирмы Везувиус (см. главу 11.2).

8.3.3 Ось рокера

- Тщательно очистите ось и отверстия для маленького штифта. Проконтролируйте, чтоб не было локального износа поверхности оси.
- Измерьте диаметр оси в 3-х точках. Если диаметр меньше, чем 14,2мм, даже в одной точке, замените ось.

8.3.4 Пружина

- Протестируйте пружину проверочным инструментом

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8.3.5 Огнезащита

Проверьте размер центрального отверстия огнезащиты.

Если диаметр отверстия больше, чем 85мм, замените огнезащиту.

Примечание: Если применяется погружной стакан, то требуется огнезащита с большим, чем 80мм отверстием, но в этом случае CNC не может использоваться без погружного стакана, в противном случае надо поставить обратно огнезащиту со стандартным отверстием.

8.4 Сборка CNC-механизма

Одинаковая технология сборки применяется для обеих частей CNC-механизма.

- Установите раму одной части CNC на стол, зажим в открытом положении.

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- Установите 2 пружины в карманы на раме.

- Установите рокеры над каждой пружиной так, чтоб они приблизительно были в правильной позиции.

- Поставьте зажим в закрытое положение нажимом на рукоятку.

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<u>Примечание:</u> Выставьте оси отверстий рокеров в одну линию с осями отверстий на раме при помощи легких ударов молотком и смотря через отверстия рамы.

- Вставьте ось рокера.

- Поднимите зажим в открытое положение и зафиксируйте ось рокера шплинтом.

После этого CNC-механизм готов вернуться в производство.

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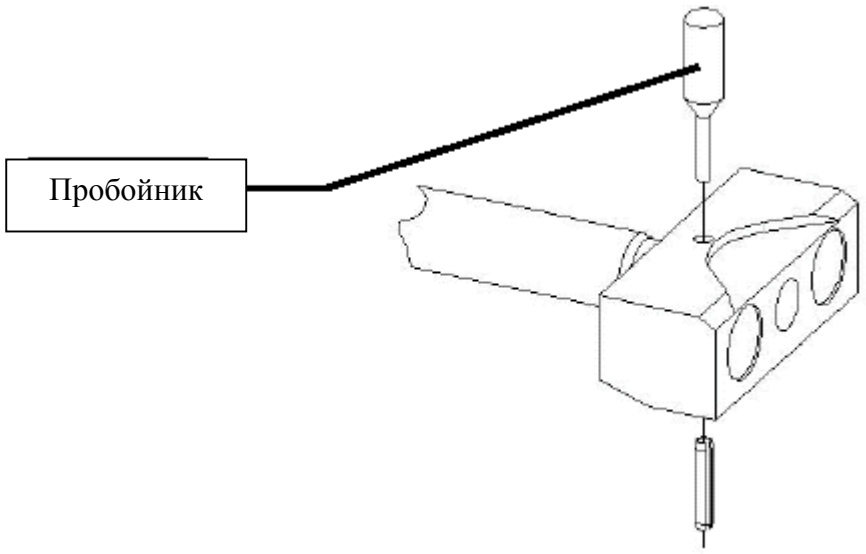
8.5 Обслуживание механизма подачи дозатора

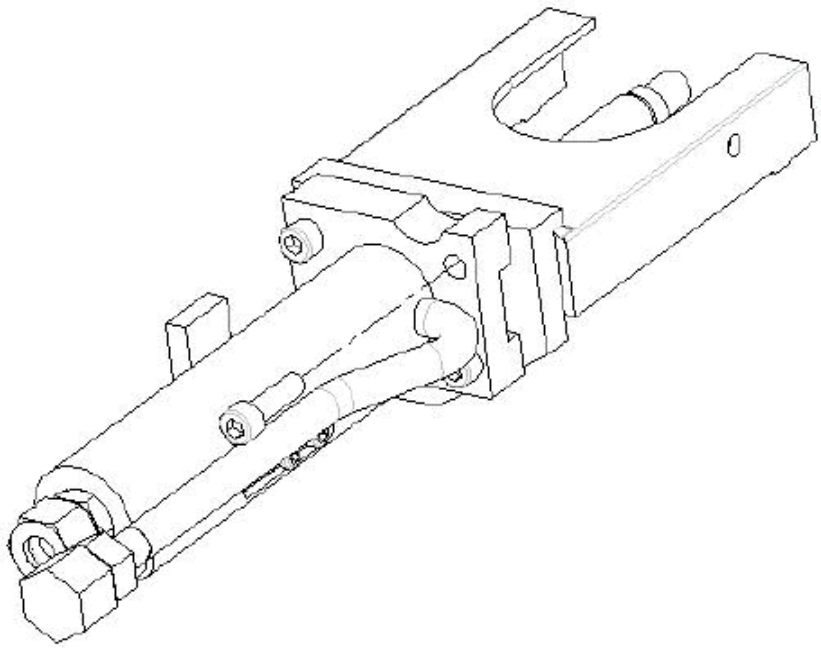
8.5.1 Процедура разборки механизма подачи дозатора

При каждом техническом обслуживании CNC-механизма должно осуществляться техобслуживание механизма подачи дозатора.
Шток должен быть полностью выведен. Для этого используйте гидростанцию.

- Удалите 5мм штифт из толкающей головки с помощью пробойника.



- Открутите толкающую головку из штока цилиндра используя гаечный ключ.
- Выкрутите 4 шурупа M10 на тыльной части цилиндра.



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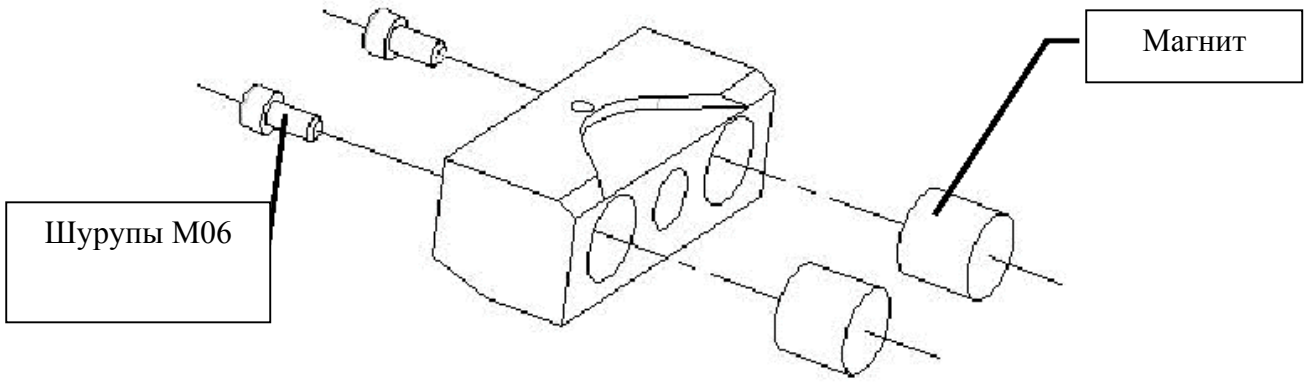
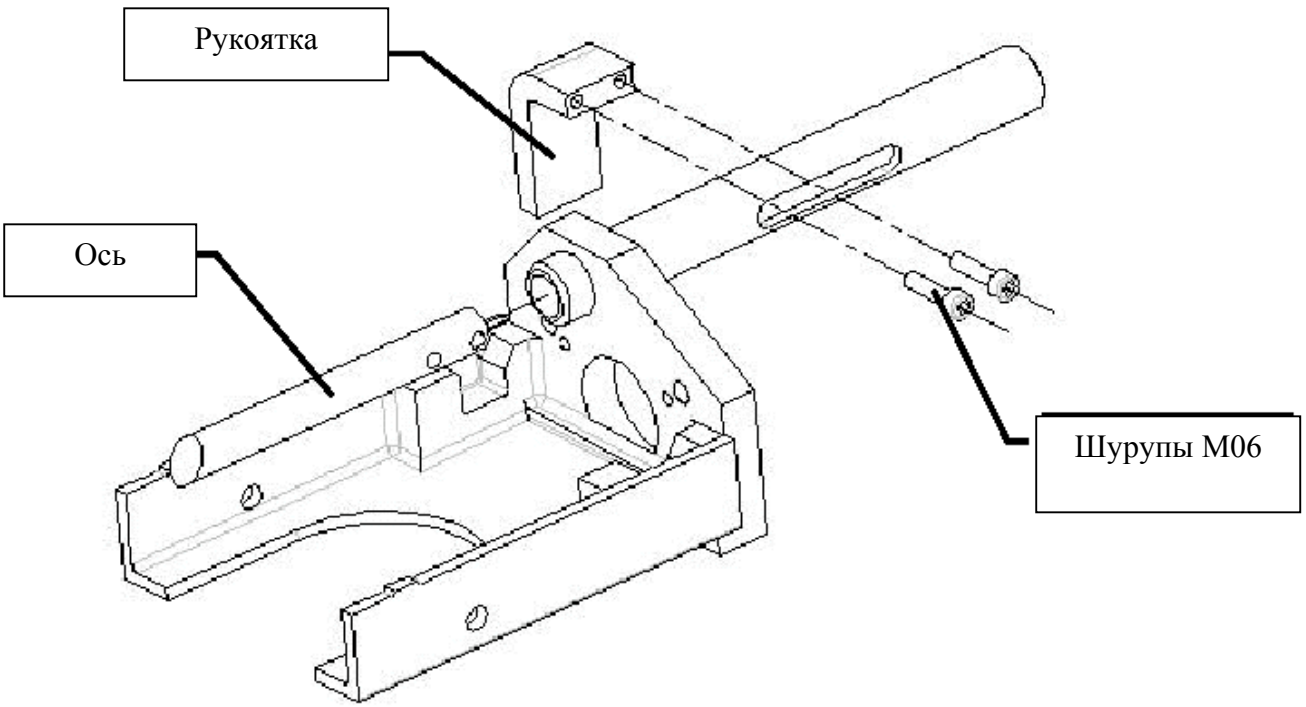
- Снимите головку цилиндра.

Если есть повреждения на магнитах, удалите магнит из гнезда, открутив шурупы M06 из задней части насадки.

Примечание: Держите магниты чистыми от металлической стружки или других металлических предметов.



Если есть повреждения на защелке, разберите ее как показано на чертеже.



Примечание: Для обслуживания гидростанции, коробки клапанов и аккумулятора, см. инструкции поставщика гидравлики.

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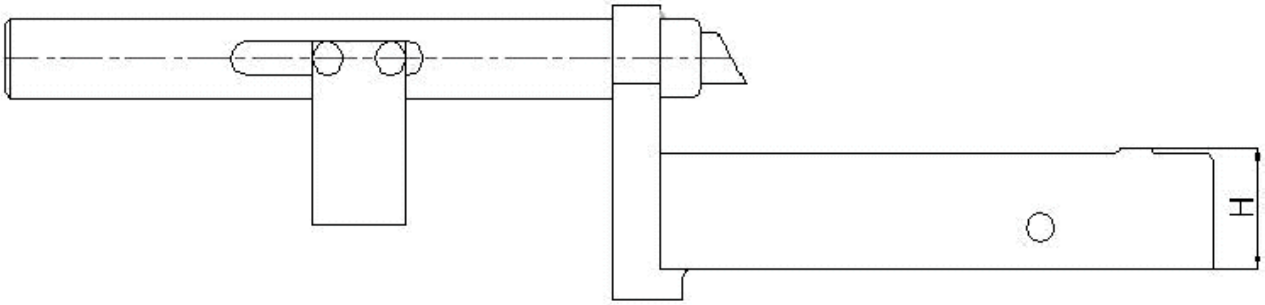
8.5.2 Инспектирование

Гидравлический цилиндр должен быть проинспектирован на предмет износа и поломок.
Проверьте и замените, если необходимо, прокладки, в случае протекания жидкости.
Проверьте цилиндр и шток на предмет деформаций или других физических повреждений.
Проверьте износ механизма подачи дозатора следующим способом:

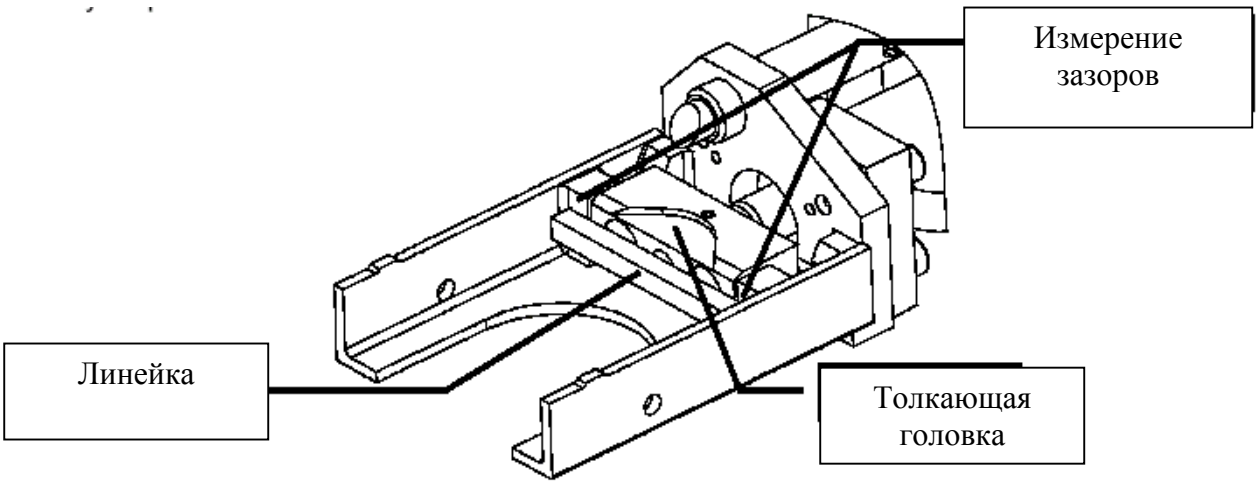
- Измерьте размер H с каждой стороны механизма подачи дозатора; если размер меньше, чем 37,3мм, он должен быть заменен.



Механизм защелки может быть использован для новой головки цилиндра.

8.5.3 Механизм подачи дозатора в сборе

В собранном состоянии, проверьте положение насадки следующим способом.
Положите линейку на толкающую головку.



- Если удалось:

Положите линейку в насадку (шток цилиндра полностью втянут в цилиндр) и попробуйте провести щуп 1мм между линейкой и механизмом подачи с каждой стороны.

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- Если не удалось:

Положите линейку на поверхность механизма подачи дозатора и попытайтесь провести щупом 0,5мм между линейкой и насадкой.
Если щуп смог пройти, то механизм подачи дозатора собран неправильно, и он должен быть собран заново.

8.5.4 Процедура сборки

Процедура сборки происходит в обратном порядке.

9. АСПЕКТЫ ОХРАНЫ ОКРУЖАЮЩЕЙ СРЕДЫ

Все отходы от применения CNC-механизма должны быть собраны в подходящую емкость для дальнейшей переработки или утилизации, согласно местным правилам охраны окружающей среды.

Используйте рекомендации поставщика по применению и утилизации жидкостей и смазок.

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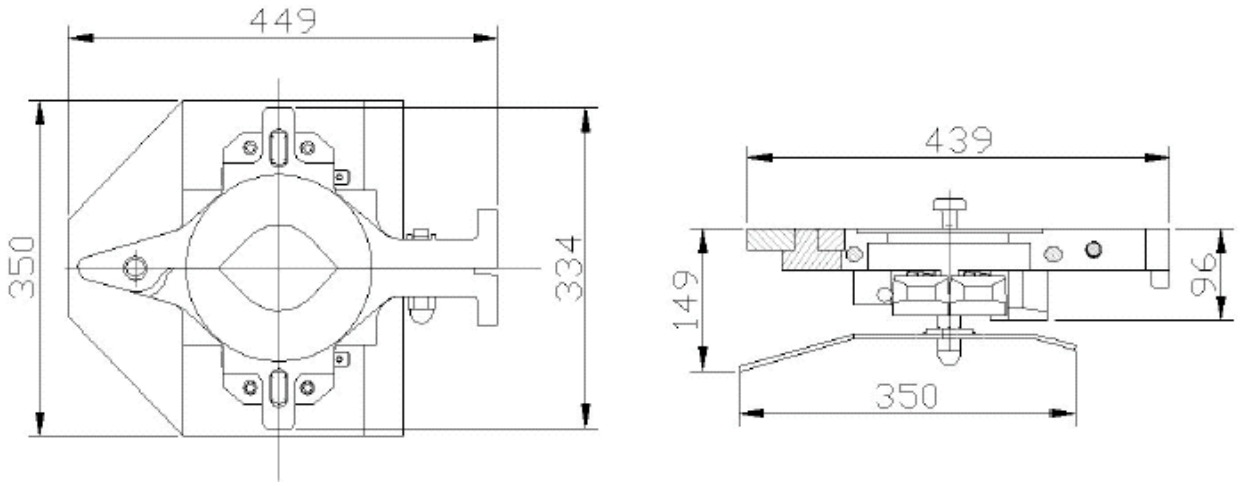
10. ОБЩАЯ ТЕХНИЧЕСКАЯ СПЕЦИФИКАЦИЯ

10.1 Дизайн CNC-механизма

Технические данные



Общий вес огнеупоров 25,7кг

Технические данные огнеупоров

- Диаметр отверстия до 20мм
- Размер дозатора 120 мм,квадрат
- Общая толщина верхнего дозатора 73 мм
- Общая толщина нижнего дозатора 54 мм
- Общая толщина заглушки 50 мм
- Рабочая толщина дозаторов и заглушки 30 мм
- Оболочка стальной кожух

10.2 Механизм подачи дозатора(гидравлический цилиндр)

- Среднее время замены дозатора 0,2-0,3 секунды
- Номинальный ход 130 мм
- Диаметр штока 22 мм
- Общий вес менее 10 кг

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Рекомендованное давление для безопасной работы CNC-механизма

	Диаметр цилиндра	
	40	50
Номинальное давление (бар)	210	160
Расход (л/мин)	50	77

Необязательно: Рекомендуемое воздушное охлаждение для механизма подачи дозатора (*)

Воздушное охлаждение	
Рабочее давление (бар)	6
Минимальный расход (Нл/мин)	500

(*) Если это не возможно свяжитесь с представителем фирмы Везувиус (см. главу 12.2)

10.3 Транспортировка

Все оборудование может быть транспортировано вручную.

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11. ГАРАНТИИ И ОБСЛУЖИВАНИЕ ЗАКАЗЧИКА

11.1 Гарантийные условия

1. Фирма «Везувиус» не несет ответственности за дефекты, вызванные материалами или проектами, поставленными заказчиком.

2. Фирма «Везувиус» несет ответственность только за дефекты, которые возникают во время действий, предусмотренных в контракте и при правильном использовании оборудования фирмы «Везувиус».

3. Ответственность фирмы «Везувиус» не распространяется на дефекты, которые вызваны неправильным обслуживанием, неправильным монтажом или неправильным ремонтом со стороны Заказчика, или изменениями, выполненными без согласия фирмы «Везувиус» в письменном виде.

4. Ответственность фирмы «Везувиус» не распространяется на производственный износ или усталость материалов.

Для дальнейшей детализации условий обратитесь, пожалуйста, к соответствующим параграфам продажных документов или контракта.

11.2 Обслуживание заказчика

При возникновении вопросов:

Свяжитесь

- с местным представительством фирмы Vesuvius
- Служба работы с заказчиками «Везувий системз»:
  +32 65 / 400 810

VESUVIUS® SYSTEMS

CALIBRATED NOZZLE CHANGER

CUSTOMER FILE

MECHANICAL EQUIPMENT	1	
	2	
	3	
	4	
	5	
HYDRAULIC EQUIPMENT	6	
	7	
	8	
	9	
TOOLS	10	
INSTRUCTIONS	11	
REFRACTORIES	12	**REFRACTORY DRAWINGS**
PURCHASE	13	
	14	
AUTOMATION	15	
	16	

VESUVIUS SYSTEMS

CALIBRATED NOZZLE CHANGER

CUSTOMER FILE

MECHANICAL EQUIPMENT 1
2
3
4
HYDRAULIC EQUIPMENT 5
6
7
8
9
TOOLS 10
INSTRUCTIONS 11
REFRACTORIES 12
PURCHASE 13 SCOPE OF SUPPLY
14
AUTOMATION 15
16

VESUVIUS GROUP S.A.
Rue de Douvrain, 17
B-7011 GHLIN
BELGIQUE

Vesuvius Systems Ghlin | Item's part List | Level: All

PR61113-2 **SCOPE OF SUPPLY-ENAKIEVO-CNC** **PL**

Level	Project	Revision	Type	Marker	Description	Quantity	Unit	Format
0	**PR61113-2-01**		**ITEM**		**MAIN OR VESSEL EQUIPMENT**			**PL**
1	9A59165	04	BOM	A1	CNC GATE W/O HEAT SHIELD	18,00	PC	A1
1	9A28338	07	ITEM	A2	HEAT SHIELD	18,00	PC	A2
0	**PR61113-2-02**				**CASTING AREA STATIONARY EQUIP**			**PL**
1	0731000	01	ITEM	C10	PUSH BUTTON BLACK	6,00	PC	A4
1	9D12066	00	ITEM	C8	CONTROL CABINET +U0050	1,00	PC	HF
1	9D12058	00	ITEM	C8	E-CLOSE BOX +U0017	1,00	PC	HF
0	**PR61113-2-03**				**CASTING AREA ON BOARD EQUIPMEN**			**PL**
1	9D13222		ITEM	C10	JUNCTION BOX U1040 - PR61113	1,00	pc	HF
1	9D13223		ITEM	C10	JUNCTION BOX U1041 - PR61113	1,00	pc	HF
1	9D13224		ITEM	C10	JUNCTION BOX U2040 - PR61113	1,00	pc	HF
1	9D13225		ITEM	C10	JUNCTION BOX U2041 - PR61113	1,00	pc	HF
1	9D11621	00	BOM	C123	HYDRAULIC CABINET SET	1,00	PC	PL
1	9D11407	00	BOM	C4	SET OF FITTINGS & COUPLINGS	2,00	PC	PL
1	1773003	03	ITEM	C5	HOSE DN12 16S L=3000	24,00	PC	A3
1	9C67151	02	BOM	C6	PLATE LOADER EXTENDED ASSY DIA	12,00	PC	A1
0	**PR61113-2-04**				**PREPARATION AREA EQUIPMENT**			**PL**
1	9B68760		ITEM		WOLFRACOAT C 1.2KG	5,00	PC	A4
1	9A54664	01	BOM	E1	PREPARATION TABLE ASSY	1,00	PC	A1
1	9A31431	05	ITEM	E2	CHECKING TOOL FOR SPRING	1,00	PC	A3
1	9A12993	00	ITEM	E3	GATE WRENCH	1,00	PC	A3
1	0009688	00	ITEM	E4	CENTERING TOOL	1,00	PC	A2
1	9C26314	00	ITEM	E5-1	PLATE CENT.TOOL DIA18.5X15	1,00	PC	A3
1	9C04252	00	ITEM	E5-2	PLATE CENT.TOOL DIA18.5X15.5	1,00	PC	A3
1	9A14387	00	ITEM	E5-3	PLATE CENTERING TOOL 18.5X16	1,00	PC	A3
1	9B26660	00	ITEM	E5-4	PLATE CENTERING TOOL 18.5X16.5	1,00	PC	A3
1	9B31124	00	ITEM	E7	OPEN GATE TOOL	1,00	PC	A2
1	9E01622	00	BOM	E8	WELL RAM FIXTURE ASSY	1,00	PC	A2
0	**PR61113-2-05**				**MAINTENANCE AREA EQUIPMENT**			**PL**
0	**PR61113-2-06**				**COMMISSIONING SPARES**			**PL**
1	0008446	05	BOM	S1	ROCKER CNC	4,00	PC	A2
1	9A13306	01	BOM	S12	SET OF SEALS	1,00	PC	PL
1	9A04396	05	ITEM	S2	ROCKER SHAFT	2,00	PC	A3
1	9A23917		ITEM	S3	SPRING	8,00	PC	A4
1	9A30177		ITEM	S4	NUT DIN6331 M16	4,00	PC	A4
1	9B59272	03	ITEM	S5	TBOLT 145	4,00	PC	A3
1	9A31175		ITEM	S6	NUT DIN1587 INOX M16	8,00	PC	A4
1	9A31241	02	ITEM	S7	TBOLT 75	2,00	PC	A3
0	**PR61113-2-07**				**LONG TERM SPARES**			**PL**
0	**PR61113-2-08**				**PROJECT DOCUMENTATION**			**PL**
0	**PR61113-2-09**				**SDA TECHNICAL GUARANTY**			**PL**
0	**PR61113-2-10**				**SDA SALES POLICY-DISCOUNT**			**PL**
0	**PR61113-2-11**				**SDA NEW DESIGN**			**PL**

VESUVIUS SYSTEMS

CALIBRATED NOZZLE CHANGER

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Section	Customer order number	DESCRIPTION	Supplier	VESUVIUS order number	Drawing number	Quant. inst.	Needs 1 year	Capital Spares	Unit	C/S	Qty delivered with the project
		VESUVIUS NOZZLE CHANGER EQUIPMENT AND ACCESSORIES									
		TUNDISH AND RELATED EQUIPMENT									
		MECHANICS									
A.1		**CNC gate assy W/O heat shield**	**VESUVIUS**	**9A59165**	**9A59165 (V.04)**	**18**	/		/	/	
A.1.		CNC gate assy W/O heat shield	VESUVIUS	9A59165	9A59165 (V.04)	(1)	3	X	Piece	S	
A.1.1.1		Female main frame	VESUVIUS	9A23800	9A23800 (V.05)	1	3	X	Piece	S	
A.1.1.2		Male main frame	VESUVIUS	9A23792	9A23792 (V.06)	1	3	X	Piece	S	
A.1.1.3		Rocker shaft	VESUVIUS	9A04396	9A04396 (V.04)	2	24	X	Piece	S	
A.1.1.4		Rocker	VESUVIUS	0008446	0008446 (V.04)	4	32	X	Piece	S	
A.1.1.5		T-Bolt 145	VESUVIUS	9B59272	9B59272 (V.02)	2	24		Piece	S	
A.1.1.6		Spring	VESUVIUS	9A23917	9A23917 (V.00)	4	48	X	Piece	S	
A.1.1.7		T-Bolt 75	VESUVIUS	9B31241	9B31241 (V.01)	1	12		Piece	S	
A.2		CNC Heat shield	VESUVIUS	9A28338	9A28338 (V.07)	18	6	X	Piece	S	
		HYDRAULICS									
		The hydraulic unit is not delivered By Vesuvius									
C.6		**Plate loader assy Diam. 40 mm**	**VESUVIUS**	**9C67151**	**9C67151 (V.00)**	**12**	/		/	/	
C.6		Plate loader assy Diam. 40 mm	VESUVIUS	9C67151	9C67151 (V.00)	(1)	3	X	Piece	S	
C.6.1		Spring	VESUVIUS	0008846	0008446 (V.00)	1	3	X	Piece	S	
C.6.2		Heat shield	VESUVIUS	9E00473	9E00473 (V.00)	1	3	X	Piece	S	
C.6.3		Cylinder diam. 40 mm	VESUVIUS	9B27213	9B27213 (V.01)	1	0	X	Piece	S	
C.6.4		Set of seals	VESUVIUS	9B31892	9B31892 (V.00)	(1)	5	X	Piece	S	
C.6.5		Ram head	VESUVIUS	9B26272	9B26272 (V.02)	1	3	X	Piece	S	
C.6.6		Magnet modified	VESUVIUS	9B29614	9B29614 (V.00)	1	3	X	Piece	S	

Section	Customer order number	DESCRIPTION	Supplier	VESUVIUS order number	Drawing number	Quant. inst.	Needs 1 year	Capital Spares	Unit	C/S	Qty delivered with the project
C.1		**HYDRAULIC CABINET**	**VESUVIUS**	**9E00468**	**9E00468 (V.01)**	**2**	**/**		**/**	**/**	
		This cabinet includes the Accumulator unit 20L 9A42248, the Isolation valve block 9A33056 and the Firing blocks complete 9A33064									
C.1.		***Accumulator unit 20L***	***VESUVIUS***	***9A42248***	***9A42248 (V.03)***	***(2)***	**/**		**/**	**/**	
C.1.1		Seal kit for accumulator 20L	HYDAC	9C25829		(1)	1		Piece	S	0
C.1.2		Anti-extrusion ring for accumulator 20L	HYDAC	9C25837		(1)	1		Piece	S	0
C.1.3		Accumulator bladder	HYDAC	9C25845		(1)	2		Piece	S	0
C.1.4		Safety block seal kit	REXROTH BOSCH	9C25852		(1)	1		Piece	S	0
C.1.5		Safety valve	REXROTH BOSCH	0000250		(1)	1	X	Piece	S	0
C.2		***Isolation valve block***	***VESUVIUS***	***9A33056***	***9A33056(V.00)***	***(2)***	**/**		**/**	**/**	
C.2.1		Control cartridge	REXROTH BOSCH	1795900		1	1	X	Piece	S	0
C.2.2		Control cover	REXROTH BOSCH	1796400		1	1	X	Piece	S	0
C.2.3		Check valve cartridge	REXROTH BOSCH	9A28452		1	1	X	Piece	S	0
C.2.4		Pressure switch	REXROTH BOSCH	9A10419		1	1	X	Piece	S	0
C.2.5		Directional valve 2/3-way	REXROTH BOSCH	1796300		1	1	X	Piece	S	0
C.2.6		Solenoid valve adaptor with LED diode	MURRELEKTRONIK	0006770		1	2	X	Piece	S	0
C.3		***Firing block complete***	***VESUVIUS***	***9A33064***	***9A33064(V.02)***	***(6)***	**/**		**/**	**/**	
C.3.1		Directional valve	REXROTH BOSCH	9A27777		2	2	X	Piece	S	0
C.3.2		Flow control valve	REXROTH BOSCH	1797000		2	2	X	Piece	S	0
C.3.3		Solenoid valve adaptor with LED diode	MURRELEKTRONIK	0006770		2	4	X	Piece	S	0
		AUTOMATION									
		Not delivered By Vesuvius									

Section	Customer order number	DESCRIPTION	Supplier	VESUVIUS order number	Drawing number	Quant. inst.	Needs 1 year	Capital Spares	Unit	C/S	Qty delivered with the project
		NOZZLE CHANGER PREPARATION AREA									
		TOOLS									
E.		**General tools**	**VESUVIUS**	/	/	/	/		/	/	
E.3		Gate wrench	VESUVIUS	9A12993	9A12993 (V.00)	1	1	X	Piece	S	
E.5.1		Plate centering tool 18.5x15.5	VESUVIUS	9C04252	9C04252(V.00)	1	1	X	Piece	S	
E.5.2		Plate centering tool 18.5x16	VESUVIUS	9A14387	9A14387(V.00)	1	1	X	Piece	S	
E.5.3		Plate centering tool 18.5x16.5	VESUVIUS	9B26660	9B26660 (V.00)	1	1	X	Piece	S	
E.7		Open gate tool	VESUVIUS	9B31124	9B31124 (V.00)	1	1	X	Piece	S	
E.8		Well ram fixture assembly	VESUVIUS	9E01622	9E01622(V.00)	1	1	X	Piece	S	
		The "Capital" spares marked with "X" are expected to last more than one year if not subject to abuse.									
		We recommend you to have these parts in a strategic stock for immediate use in case of necessity.									
		Screws and nuts from DIN standards are not included into the Spare parts list and can be purchased locally.									

VESUVIUS SYSTEMS

CALIBRATED NOZZLE CHANGER

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AUTOMATION	16

FAX FROM : **VESUVIUS SYSTEMS-GHLIN**
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GSM
GSM
E-mail christophe.dewaulle@vesuvius.com

TO :

ATTENTION :

COPY :

FILE : last modified: 09/01/076

SUBJECT : PR61113 Enakievo CNC basic engineering

Notice: all dimensions are expressed in millimeter, H = height, L = width, P = depth

Components installed on the tundish cars

HYDRAULIC BLOCKS Uij20 (i = 1 to 2, j = 7 to 9)

Type: hydraulic manifold block

Dimensions: approximately:

H = 300
L = 200
P = 250

see mechanical drawings for exact dimensions.

Location: on tundish car i.

Function:

Contains the hydraulic components for the control of the mechanisms for two casting strands:

i.e strands 1 & 2 (j = 7)
i.e strands 3 & 4 (j = 8)
i.e strands 5 & 6 (j = 9)

For one casting strand, the components with an electrical function are:

1 "firing" valve with 1 solénoïd 24 VDC, return by spring.

Supplied by: Vesuvius Systems

HYDRAULIC BLOCKS Ui020 (i = 1 to 2)

Type: hydraulic manifold block
steel box containing terminals strip (Ref 208-633 WAGO).
The electrical components are wired to a junction box mounted inside the hydraulic cabinet.

All the components are wired to a junction box mounted inside the cabinet itself.

Dimensions: approximately:

H = 250
L = 145
P = 160

see mechanical drawings for exact dimensions.

Dimensions: approximately:

H = 180
L = 180
P = 90

Location: on tundish car i.

Function:

Contains the hydraulic components common to the control of the mechanisms for all casting strands, i.e.:

1 "pressure" valve with 1 solenoid 24 VDC, return by spring.
1 pressure switch "pressure ok"
6 “firing”valves for strands from UIJ20

Supplied by: Vesuvius Systems

MOBILE JUNCTION BOX Ui040 (i = 1 to 2)

Type: RITTAL KL 1516.210. Vesuvius recommends to use WAGO spring terminals with 4 entries. Number of terminals = 4 + number of strands x 2.

Dimensions:

H = 200
L = 200
P = 80

Location: on tundish car i, at the arrival point of the drag chain.

Function:

Contains a terminal strip for the connection of the cables arriving from the cable chain to the ones running on the tundish car to the hydraulic blocks.

Supplied by: others

Components installed on the casting floor

FIXED JUNCTION BOX Ui041 (i = 1 to 2)

Type: RITTAL KL 1516.210. Vesuvius recommends to use WAGO spring terminals with 4 entries. Number of terminals = 4 + number of strands x 2.

Dimensions:

H = 200
L = 200
P = 80

Location: on the casting floor, at the arrival point of the drag chain of tundish car i.

Function:

Contains a terminal strip for the connection of the cables arriving from the cable chain to the ones going to the electrical cabinet U0050

Supplied by: others

OPERATOR'S PANEL U0j15 (j = 1 to 6)

Type: n.a.

Dimensions:

Location: on the casting floor

Function: On the existing panels, a push button "nozzle change" will be added for each casting strand.

Supplied by: others

EMERGENCY CLOSE U0017

Type: aluminium box with bolted cover, by ROSE, with a latched emergency switch ("mushroom") with 1 N.C. contacts

Dimensions: W = 160
H = 160
D = 90

Located: on the escape way from the casting floor

Function: when pushed, the gates on the tundish car in casting position, if any, close and cannot be reopened; this button is used only for emergency purposes.

Supplied by: Others

Components installed in the elctrical room

CONTROL CABINET U0050

Type: RITTAL

Dimensions:

H = 760
L = 760
P = 210

Location: in the electrical room

Function:

Contents:

- main switch
- power supply 220 VAC - 24 VDC
- protections
- sequential programmable relay Siemens type LOGO

Supplied by: Others

POWER SUPPLY U0060

Type: 220 VAC 50 Hz 5 Ampères, instrumentation quality.

Dimensions: n.a.

Location:

Function: supply the voltage necessary for the working of the hydraulic components for the nozzle changers.

Supplied by: others

COMMON INTERFACE U0035

This virtual block represents the exchange of information with the continuous casting machine.

signals read by the CNC control system:

- tundish car left in casting position: potential-free contact
- tundish car right in casting position: potential-free contact

Cables list:

legend:

column 1: cable starts from block ...
column 2: cable arrives at block ...
column 3: cable has number ...
column 4: cable type according to attached specifications
column 5: number and section of the wires / number of spares if any indicated as (sp ...)
column 6: signal level on the cable:
A = power 380 V or 220 V
B = power 24 VDC
C = control 24 VDC
D = analog signal 0 - 10 V
E = analog signal 0/4 - 20 mA
F = digital data transmission
G = analog signal, other level

1 Cables for the components on tundish car # 1

1.1 Cables installed on the tundish car

1.1.0 Cables for the common hydraulic block

U1020	U1020	1020.1	NGGF	2 x 1 mm^2	C
U1020	U1020	1020.2	NGGF	2 x 1 mm^2	C

1.1.1 Cables for strands # 1 & 2

U1720	U1020	1720.1	NGGF	2 x 1 mm^2	C
U1720	U1020	1720.2	NGGF	2 x 1 mm^2	C

01.1.2 Cables for strand # 3 & 4

U1820	U1020	1820.1	NGGF	2 x 1 mm^2	C
U1820	U1020	1820.2	NGGF	2 x 1 mm^2	C

1.1.3 Cables for strand # 5 & 6

U1920	U1020	1920.1	NGGF	2 x 1 mm^2	C
U1920	U1020	1920.2	NGGF	2 x 1 mm^2	C

1.1.4 Cables for the Hydraulic junction box

U1020	U1040	1020.3	NGGF	18 x 1 mm^2	C

1.2 Cables in the drag chain

U1040	U1041	1040.1	NGGFF	18 x 1 mm^2 (2 sp)	C

1.4 Cables from the drag chain to the electrical room

U1041	U0050	1041.1	NYY	18 x 1 mm2 (2 sp)	C

2 Cables for the components on tundish car # 2

2.1 Cables installed on the tundish car

2.1.0 Cables for the common hydraulic block

U2020	U2020	2020.1	NGGF	2 x 1 mm^2	C
U2020	U2020	2020.2	NGGF	2 x 1 mm^2	C

2.1.1 Cables for strands # 1 & 2

U2720	U2020	2720.1	NGGF	2 x 1 mm^2	C
U2720	U2020	2720.2	NGGF	2 x 1 mm^2	C

2.1.2 Cables for strand # 3 & 4

U2820	U2020	2820.1	NGGF	2 x 1 mm^2	C
U2820	U2020	2820.2	NGGF	2 x 1 mm^2	C

2.1.3 Cables for strand # 5 & 6

U2920	U2020	2920.1	NGGF	2 x 1 mm^2	C
U2920	U2020	2920.2	NGGF	2 x 1 mm^2	C

2.1.4 Cables for the Hydraulic junction box

U2020	U2040	2020.3	NGGF	18 x 1 mm^2	C

2.2 Cables in the drag chain

U2040	U2041	2040.1	NGGFF	18 x 1 mm^2 (2 sp)	C

2.4 Cables from the drag chain to the electrical room

U2041	U0050	2041.1	NYY	18 x 1 mm2 (2 sp)	C

3 Cable from the power supply

U0060	U0050	0060.1	NYY-J	2 x 2.5 + 2.5 mm^2	A

4 Cables to the operator pendants

U0115	U0050	0115.1	NYY	2 x 1 mm^2	C
U0215	U0050	0215.1	NYY	2 x 1 mm^2	C
U0315	U0050	0315.1	NYY	2 x 1 mm^2	C
U0415	U0050	0415.1	NYY	2 x 1 mm^2	C
U0515	U0050	0515.1	NYY	2 x 1 mm^2	C
U0615	U0050	0615.1	NYY	2 x 1 mm^2	C

5 Cables to the common interface

U0050	U0035	U0035.1	NYY	3 x 1 mm²	C

6 Cables to the E-Close button

U0017	U0050	0017.1	NYY	2 x 1 mm²	C

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	GENERAL LAYOUT	
	CONTROL CABINET	+U0050
	E-CLOSE BOX	+U0017
	HYDRAULIC JUNCTION BOX	+UI020

VESUVIUS SYSTEMS
Rue de Douvrain, 17
B-7011 GHLIN (BELGIQUE)
Tél.: (32) 65 40 08 10

	BY	DATE	SIGN
DRAWN	DVT	11-12-2006	
CHECKED	DBE	11-12-2006	
APPROVED	DBE	11-12-2006	

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GENERAL

IND	DATE	MODIFICATION	BY
0	11-12-2006		DVT

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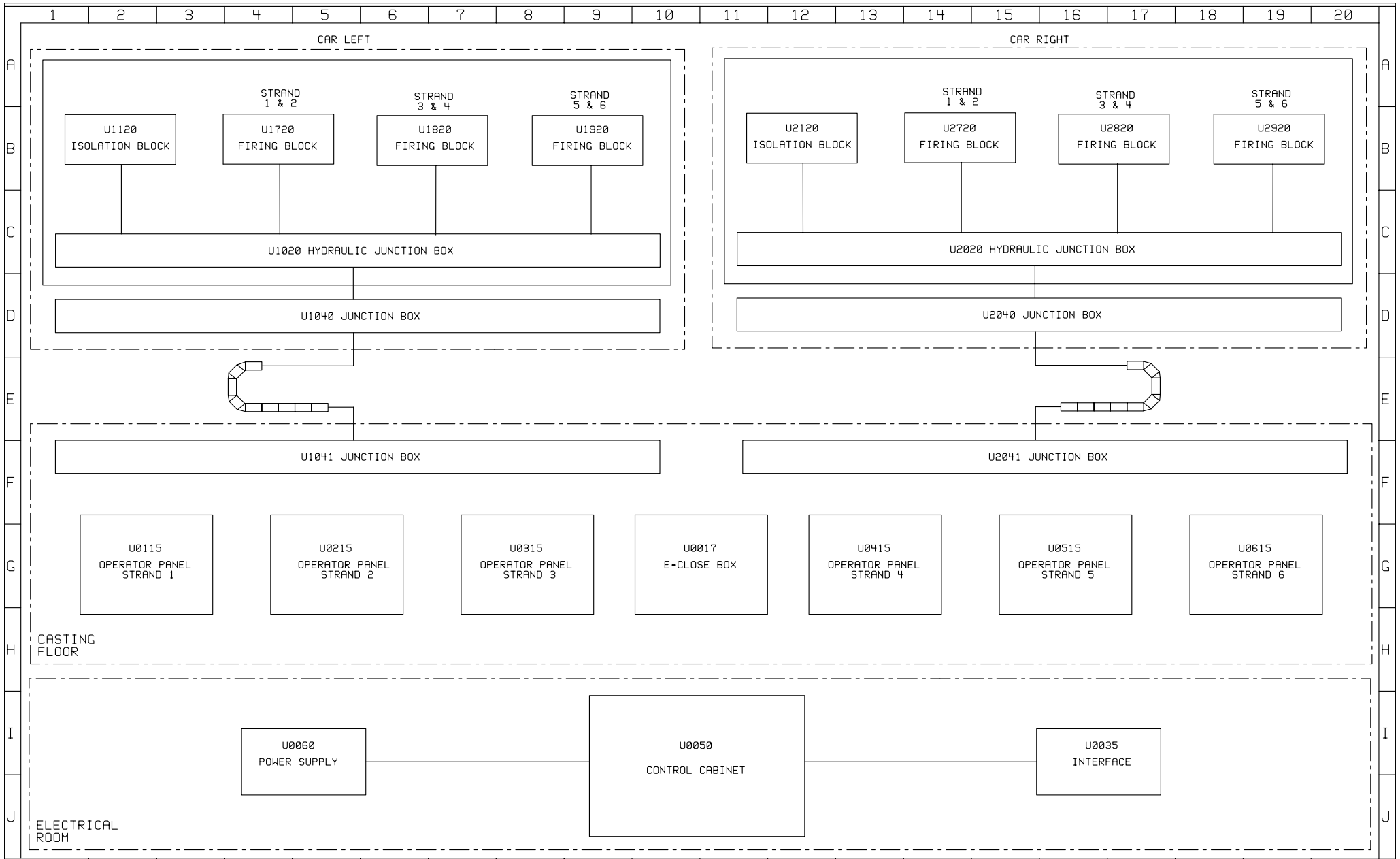

VESUVIUS SYSTEMS
Rue de Douvrain, 17
B-7011 GHLIN (BELGIQUE)
Tél.: (32) 65 40 08 10

	BY	DATE	SIGN
DRAWN	DVT	11-12-2006	
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APPROVED	DBE	11-12-2006	

AUTOMATION LAYOUT

IND	DATE	MODIFICATION	BY
0	11-12-2006		DVT

ENAKIEVO
61113

C.N.C

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CABLE LIST

N°	CABLE TYPE	FROM	DEVICE	TO	DEVICE	REMARKS
0060.1	NYY-J 2X2.5/2.5	+U0060	POWER SUPPLY	+U0050	CONTROL CABINET	
1020.1	NGGF 2X1.0	+U1120	HYDRAULIC BLOCKS	+U1020	HYD JUNCTION BOX	
1020.2	NGGF 2X1.0	+U1120	HYDRAULIC BLOCKS	+U1020	HYD JUNCTION BOX	
1720.1	NGGF 2X1.0	+U1720	HYDRAULIC BLOCKS	+U1020	HYD JUNCTION BOX	
1720.2	NGGF 2X1.0	+U1720	HYDRAULIC BLOCKS	+U1020	HYD JUNCTION BOX	
1820.1	NGGF 2X1.0	+U1820	HYDRAULIC BLOCKS	+U1020	HYD JUNCTION BOX	
1820.2	NGGF 2X1.0	+U1820	HYDRAULIC BLOCKS	+U1020	HYD JUNCTION BOX	
1920.1	NGGF 2X1.0	+U1920	HYDRAULIC BLOCKS	+U1020	HYD JUNCTION BOX	
1920.2	NGGF 2X1.0	+U1920	HYDRAULIC BLOCKS	+U1020	HYD JUNCTION BOX	
2020.1	NGGF 2X1.0	+U2120	HYDRAULIC BLOCKS	+U2020	HYD JUNCTION BOX	
2020.2	NGGF 2X1.0	+U2120	HYDRAULIC BLOCKS	+U2020	HYD JUNCTION BOX	
2720.1	NGGF 2X1.0	+U2720	HYDRAULIC BLOCKS	+U2020	HYD JUNCTION BOX	
2720.2	NGGF 2X1.0	+U2720	HYDRAULIC BLOCKS	+U2020	HYD JUNCTION BOX	
2820.1	NGGF 2X1.0	+U2820	HYDRAULIC BLOCKS	+U2020	HYD JUNCTION BOX	
2820.2	NGGF 2X1.0	+U2820	HYDRAULIC BLOCKS	+U2020	HYD JUNCTION BOX	
2920.1	NGGF 2X1.0	+U2920	HYDRAULIC BLOCKS	+U2020	HYD JUNCTION BOX	
2920.2	NGGF 2X1.0	+U2920	HYDRAULIC BLOCKS	+U2020	HYD JUNCTION BOX	
1040.1	NGGFF 18X1.0	+U1040	MOBILE JUNCTION BOX	+U1041	FIXED JUNCTION BOX	
1041.1	NYY 18X1.0	+U1041	HYDRAULIC BLOCKS	+U0050	CONTROL CABINET	
2040.1	NGGFF 18X1.0	+U2040	MOBILE JUNCTION BOX	+U2041	FIXED JUNCTION BOX	
2041.1	NYY 18X1.0	+U2041	HYDRAULIC BLOCKS	+U0050	CONTROL CABINET	
0115.1	NYY 2X1.0	+U0115	OPERATOR PANEL	+U0050	CONTROL CABINET	
0215.1	NYY 2X1.0	+U0215	OPERATOR PANEL	+U0050	CONTROL CABINET	
0315.1	NYY 2X1.0	+U0315	OPERATOR PANEL	+U0050	CONTROL CABINET	
0415.1	NYY 2X1.0	+U0415	OPERATOR PANEL	+U0050	CONTROL CABINET	
0515.1	NYY 2X1.0	+U0515	OPERATOR PANEL	+U0050	CONTROL CABINET	
0615.1	NYY 2X1.0	+U0615	OPERATOR PANEL	+U0050	CONTROL CABINET	
0017.1	NYY 2X1.0	+U0017	E-CLOSE BOX	+U0050	CONTROL CABINET	
0035.1	NYY 3X1.0	+U0035	COMMON INTERFACE	+U0050	CONTROL CABINET	

VESUVIUS SYSTEMS
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APPROVED	DBE	11-12-2006	

CABLE LIST

IND	DATE	MODIFICATION	BY
0	11-12-2006		DVT

ENAKIEVO
61113

C.N.C

CABLE LIST

N°	CABLE TYPE	FROM	DEVICE	TO	DEVICE	REMARKS
1020.3	NGGF 18X1.0	+U1020	HYD. JUNCTION BLOCK	+U1040	MOBILE JUNCTION BOX	
2020.3	NGGF 18X1.0	+U2020	HYD. JUNCTION BLOCK	+U2040	MOBILE JUNCTION BOX	

VESUVIUS SYSTEMS
Rue de Douvrain, 17
B-7011 GHLIN (BELGIQUE)
Tél.: (32) 65 40 08 10

	BY	DATE	SIGN
DRAWN	DVT	11-12-2006	
CHECKED	DBE	11-12-2006	
APPROVED	DBE	11-12-2006	

CABLE LIST

IND	DATE	MODIFICATION	BY
0	11-12-2006		DVT

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PAGE : 007

COLOR CODE

1. WHITE :	W	19. WHITE-PINK :	WP
2. BROWN :	B	20. PINK-BROWN :	PB
3. GREEN :	N	21. WHITE-BLUE :	WL
4. YELLOW :	Y	22. BROWN-BLUE :	BL
5. GREY :	G	23. WHITE-RED :	WR
6. PINK :	P	24. BROWN-RED :	BR
7. BLUE :	L	25. WHITE-BLACK :	WK
8. RED :	R	26. BROWN-BLACK :	BK
9. BLACK :	K	27. GREY-GREEN :	GN
10. VIOLET :	V	28. YELLOW-GREY :	YG
11. GREY-PINK :	GP	29. PINK-GREEN :	PN
12. RED-BLUE :	RL	30. YELLOW-PINK :	YP
13. WHITE-GREEN :	WN	31. GREEN-BLUE :	NL
14. BROWN-GREEN :	BN	32. YELLOW-BLUE :	YL
15. WHITE-YELLOW :	WY	33. GREEN-RED :	NR
16. YELLOW- BROWN :	YB	34. YELLOW-RED :	YR
17. WHITE-GREY :	WG	35. GREEN-BLACK :	NK
18. GREY-BROWN :	GB	36. YELLOW-BLACK :	YK

VESUVIUS SYSTEMS
Rue de Douvrain, 17
B-7011 GHLIN (BELGIQUE)
Tél.: (32) 65 40 08 10

	BY	DATE	SIGN
DRAWN	DVT	11-12-2006	
CHECKED	DBE	11-12-2006	
APPROVED	DBE	11-12-2006	

COLOR CODE

IND	DATE	MODIFICATION	BY
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C.N.C

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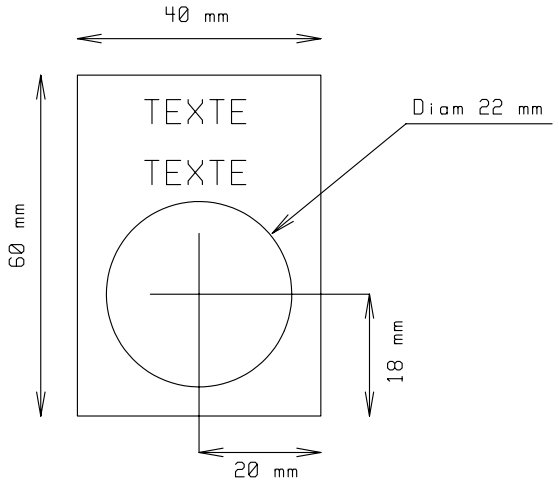
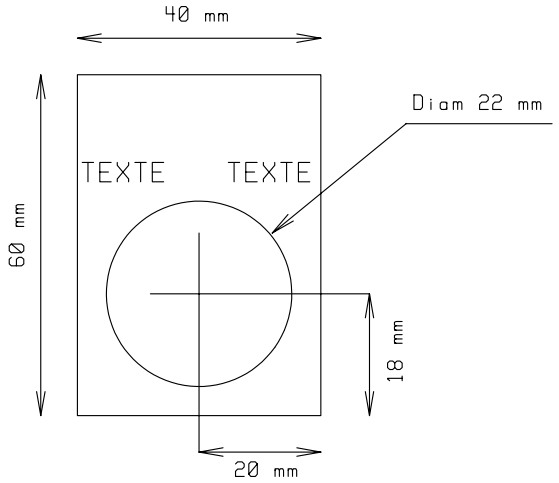
FORMAT A1

TEXTE NOIR
AU FORMAT "SIMPLE"
SUR FOND BLANC



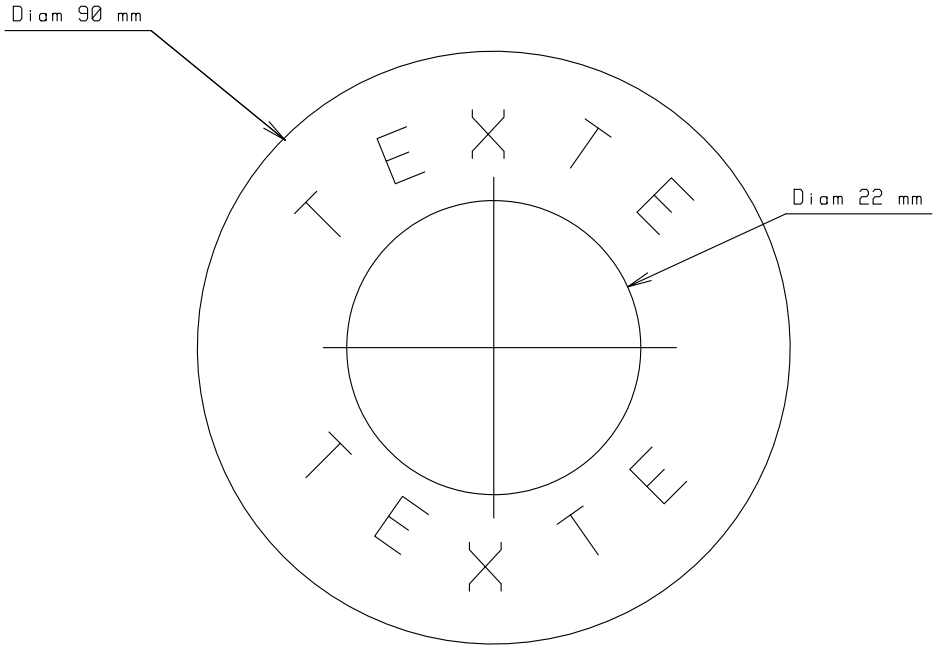
FORMAT A3

TEXTE NOIR
AU FORMAT "SIMPLE"
SUR FOND BLANC



FORMAT A2

TEXTE NOIR
AU FORMAT "SIMPLE"
SUR FOND JAUNE



TOUTE LES ETIQUETTES DOIVENT ETRE COLLEES

CES FORMATS D'ETIQUETTE CORRESPONDENT
AUX FORMATS TELEMECANIQUE

VESUVIUS SYSTEMS
Rue de Douvrain, 17
B-7011 GHLIN (BELGIQUE)
Tél.: (32) 65 40 08 10

	BY	DATE	SIGN
DRAWN	DVT	11-12-2006	
CHECKED	DBE	11-12-2006	
APPROVED	DBE	11-12-2006	

LABELS

IND	DATE	MODIFICATION	BY
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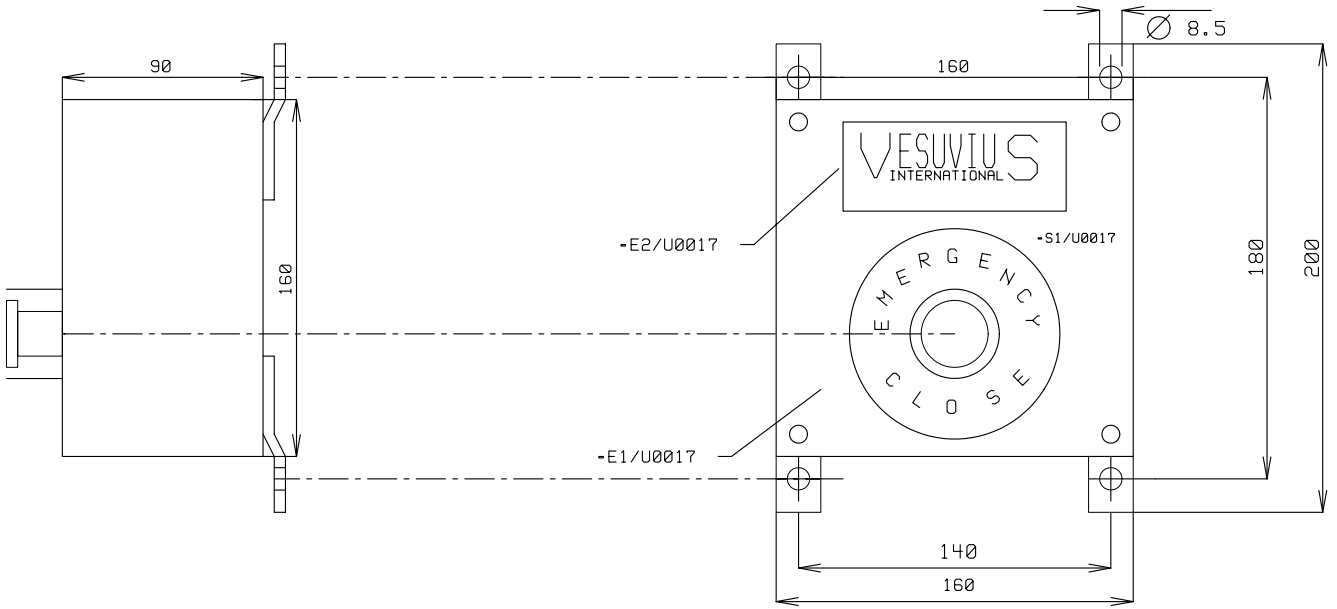

N.B. : ENGRAVE ON LABEL -E2 :

"E-CLOSE BOX +U0017"
9D12058-POXXXXX-YY

FIX LABEL -E2
WITH INOX RIVETS

PART LIST

ITEM	DESCRIPTION	MANUFACT.	REFERENCE	Qty.	VES.NUMB.
-E2/U0017	LABEL	VESUVIUS	1429000	1	1429000
-E1/U0017	BOX (160X160X90)	ROSE	01.161609 A	1	1808200
		RITTAL	9112.210 + 9121.160		
-S1/U0017	PUSH BUTTON E-CLOSE	TELEMECANIQUE	XB4-BS542	1	9B71443
-S1/U0017	PROTECTION YELLOW FOR PB	TELEMECANIQUE	ZBZ-1605	1	9B62624
-S1/U0017	LABEL DIA 90 FOR PB	TELEMECANIQUE	ZBY-8101	1	

VESUVIUS SYSTEMS
Rue de Douvrain, 17
B-7011 GHLIN (BELGIQUE)
Tél.: (32) 65 40 08 10

	BY	DATE	SIGN
DRAWN	DVT	11-12-2006	
CHECKED	DBE	11-12-2006	
APPROVED	DBE	11-12-2006	

E-CLOSE BOX

+U0017

IND	DATE	MODIFICATION	BY
0	11-12-2006		DVT

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111	EXTERNAL LAYOUT	+U0050
113	INTERNAL LAYOUT	+U0050
115	COLOR CODE	
117	LABELS	
119	P.S 220VAC	+U0050/U0060
121	P.S 24VDC	+U0050
123	POWER SUPPLY SPARE	+U0050
125	POWER SUPPLY SPARE	+U0050
127	POWER SUPPLY LOGO	+U0050
129	POWER SUPPLY LOGO	+U0050
131	D.I:PRESSURE OK	+U0050/1120/1020/1040/1041
133	D.I:BUTTONS OP	+U0050/U0J15
135	D.I:BUTTONS OP	+U0050/U0J15
137	D.I:E-CLOSE BUTTON	+U0050/U0017
139	D.I:INTERFACE+SPARE	+U0050/U0035
141	D.I:SPARE	+U0050
143	D.I:SPARE	+U0050
145	SPARE	+U0050
147	SPARE	+U0050
149	D.O:PRESS VALV CAR1	+U0050/1040/1041/1020/1120
151	D.O:PRESS VALV CAR2	+U0050/2041/2040/2020/2120
153	D.O:FIR VALV CR1 STR1	+U0050/1041/1040/1020/1720
155	D.O:FIR VALV CR1 STR2	+U0050/1041/1040/1020/1720
157	D.O:FIR VALV CR1 STR3	+U0050/1041/1040/1020/1820
159	D.O:FIR VALV CR1 STR4	+U0050/1040/1041/1020/1820
161	D.O:FIR VALV CR1 STR5	+U0050/1040/1041/1020/1920
163	D.O:FIR VALV CR1 STR6	+U0050/1041/1040/1020/1920
165	D.O:FIR VALV CR2 STR1	+U0050/2041/2040/2020/2720
167	D.O:FIR VALV CR2 STR2	+U0050/2040/2041/2020/2720
169	D.O:FIR VALV CR2 STR3	+U0050/2040/2041/2020/2820
171	D.O:FIR VALV CR2 STR4	+U0050/2041/2040/2020/2820
173	D.O:FIR VALV CR2 STR5	+U0050/2040/2041/2020/2920
175	D.O:FIR VALV CR2 STR6	+U0050/2040/2041/2020/2920
177	D.O:SPARE	+U0050
179	D.O:SPARE	+U0050

VESUVIUS SYSTEMS
Rue de Douvrain, 17
B-7011 GHLIN (BELGIQUE)
Tél.: (32) 65 40 08 10

	BY	DATE	SIGN
DRAWN	DVT	11-12-2006	
CHECKED	DBE	11-12-2006	
APPROVED	DBE	11-12-2006	

TABLE OF CONTENTS

+U0050

IND	DATE	MODIFICATION	BY
0	11-12-2006		DVT

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N° OF PAGE	TITLE	SUBTITLE
201	I/O LIST	-D.I
203	I/O LIST	-D.O
301	X1/U0050	
303	X1/U0050	
305	X1/U1040	
307	X1/U1041	
309	X1/U2040	
311	X1/U2041	
401	PART LIST	+U0050
403	PART LIST	+U0050
411	LIST FOR PURCHASE	+U0050
413	LIST FOR PURCHASE	+U0050
421	LIST FOR PURCHASE	X1/U0050
423	LIST FOR PURCHASE	X1/U0050
425	LIST FOR PURCHASE	X1/U0050

VESUVIUS SYSTEMS
Rue de Douvrain, 17
B-7011 GHLIN (BELGIQUE)
Tél.: (32) 65 40 08 10

	BY	DATE	SIGN
DRAWN	DVT	11-12-2006	
CHECKED	DBE	11-12-2006	
APPROVED	DBE	11-12-2006	

TABLE OF CONTENTS

+U0050

IND	DATE	MODIFICATION	BY
0	11-12-2006		DVT

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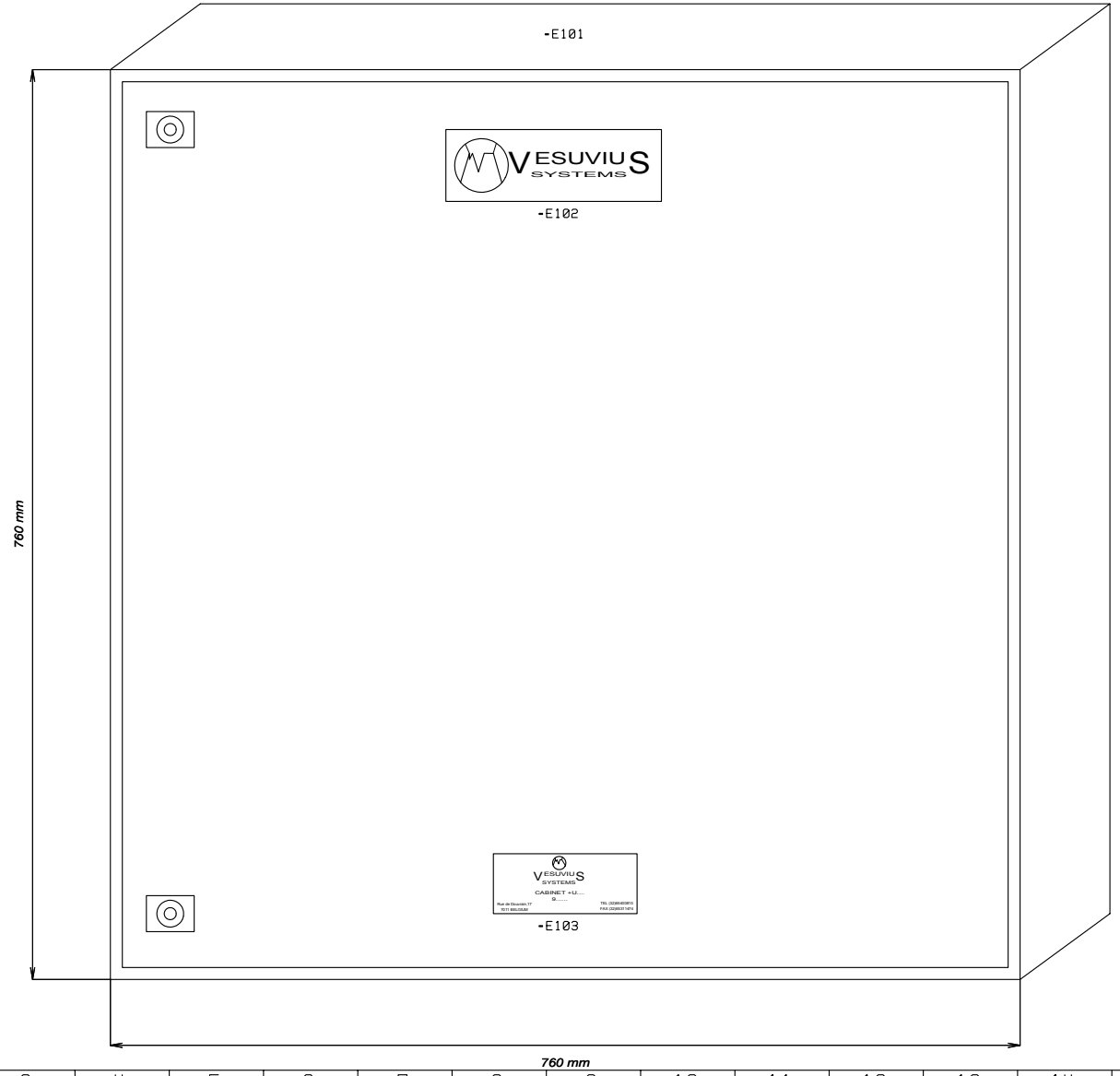

N.B : ENGRAVE ON LABEL -E003
"CONTROL CABINET +U0050"
220VAC

9D12066-POXXXXXX-YY

FIX LABELS -E102 ET -E103
WITH INOX RIVETS.

VESUVIUS SYSTEMS
Rue de Douvrain, 17
B-7011 GHLIN (BELGIQUE)
Tél.: (32) 65 40 08 10

	BY	DATE	SIGN
DRAWN	DVT	11-12-2006	
CHECKED	DBE	11-12-2006	
APPROVED	DBE	11-12-2006	

EXTERNAL LAYOUT

+U0050

IND	DATE	MODIFICATION	BY
0	11-12-2006		DVT

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C.N.C

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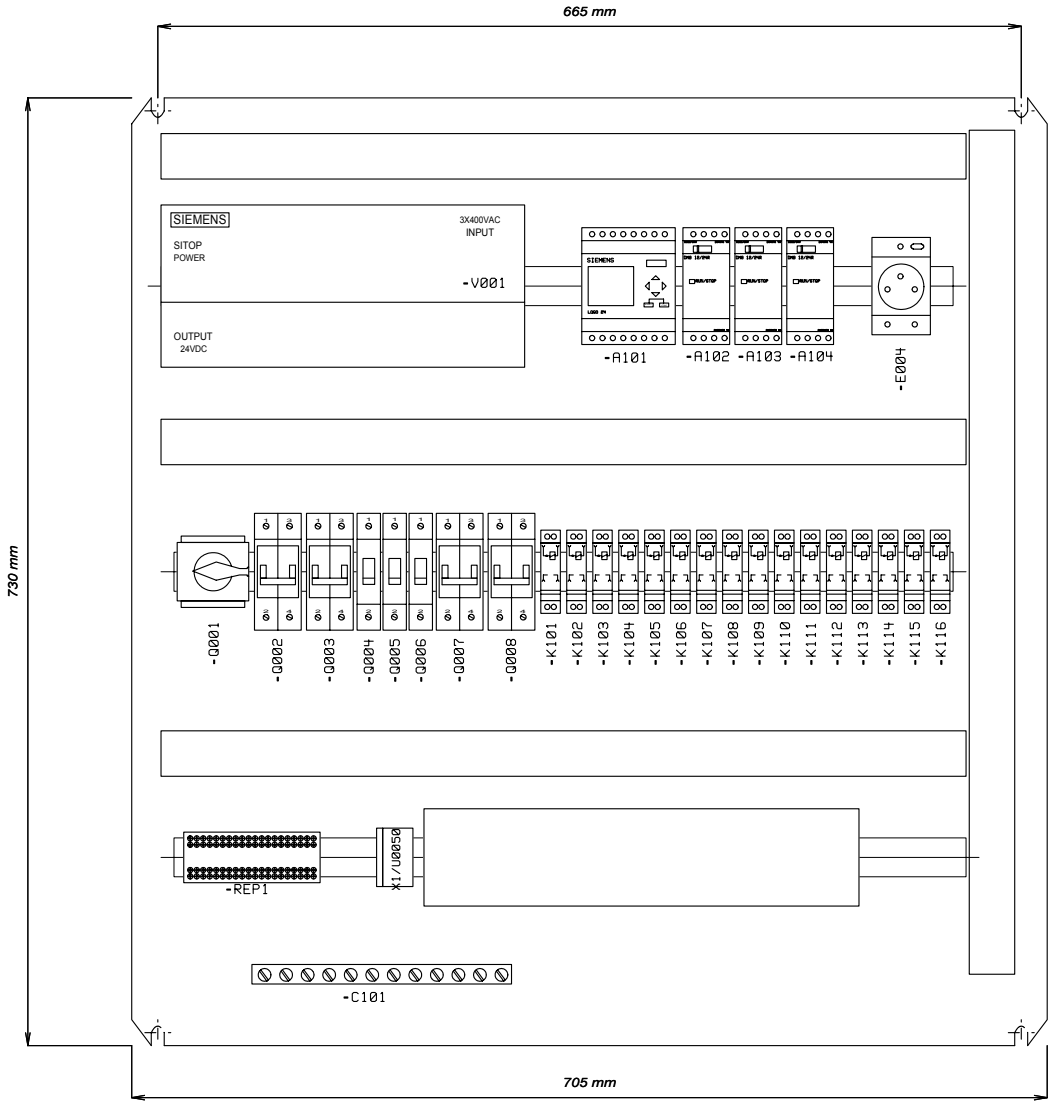

VESUVIUS SYSTEMS
Rue de Douvrain, 17
B-7011 GHLIN (BELGIQUE)
Tél.: (32) 65 40 08 10

	BY	DATE	SIGN
DRAWN	DVT	11-12-2006	
CHECKED	DBE	11-12-2006	
APPROVED	DBE	11-12-2006	

INTERNAL LAYOUT

+U0050

IND	DATE	MODIFICATION	BY
0	11-12-2006		DVT

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C.N.C

PAGE : 113

COLOR CODE

1. WHITE :	W	19. WHITE-PINK :	WP
2. BROWN :	B	20. PINK-BROWN :	PB
3. GREEN :	N	21. WHITE-BLUE :	WL
4. YELLOW :	Y	22. BROWN-BLUE :	BL
5. GREY :	G	23. WHITE-RED :	WR
6. PINK :	P	24. BROWN-RED :	BR
7. BLUE :	L	25. WHITE-BLACK :	WK
8. RED :	R	26. BROWN-BLACK :	BK
9. BLACK :	K	27. GREY-GREEN :	GN
10. VIOLET :	V	28. YELLOW-GREY :	YG
11. GREY-PINK :	GP	29. PINK-GREEN :	PN
12. RED-BLUE :	RL	30. YELLOW-PINK :	YP
13. WHITE-GREEN :	WN	31. GREEN-BLUE :	NL
14. BROWN-GREEN :	BN	32. YELLOW-BLUE :	YL
15. WHITE-YELLOW :	WY	33. GREEN-RED :	NR
16. YELLOW- BROWN :	YB	34. YELLOW-RED :	YR
17. WHITE-GREY :	WG	35. GREEN-BLACK :	NK
18. GREY-BROWN :	GB	36. YELLOW-BLACK :	YK

VESUVIUS SYSTEMS
Rue de Douvrain, 17
B-7011 GHLIN (BELGIQUE)
Tél.: (32) 65 40 08 10

	BY	DATE	SIGN
DRAWN	DVT	11-12-2006	
CHECKED	DBE	11-12-2006	
APPROVED	DBE	11-12-2006	

COLOR CODE

IND	DATE	MODIFICATION	BY
0	11-12-2006		DVT

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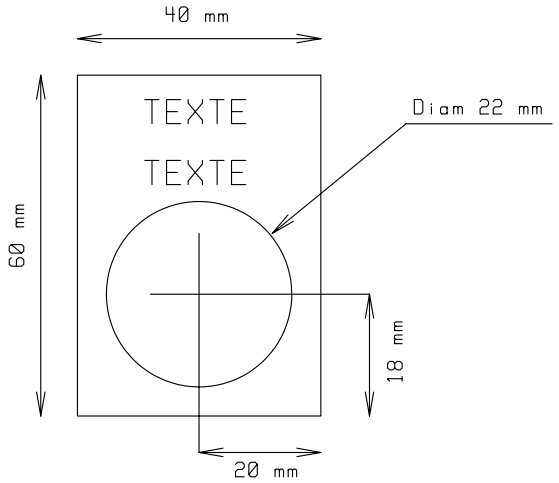
61113

C.N.C

PAGE : 115

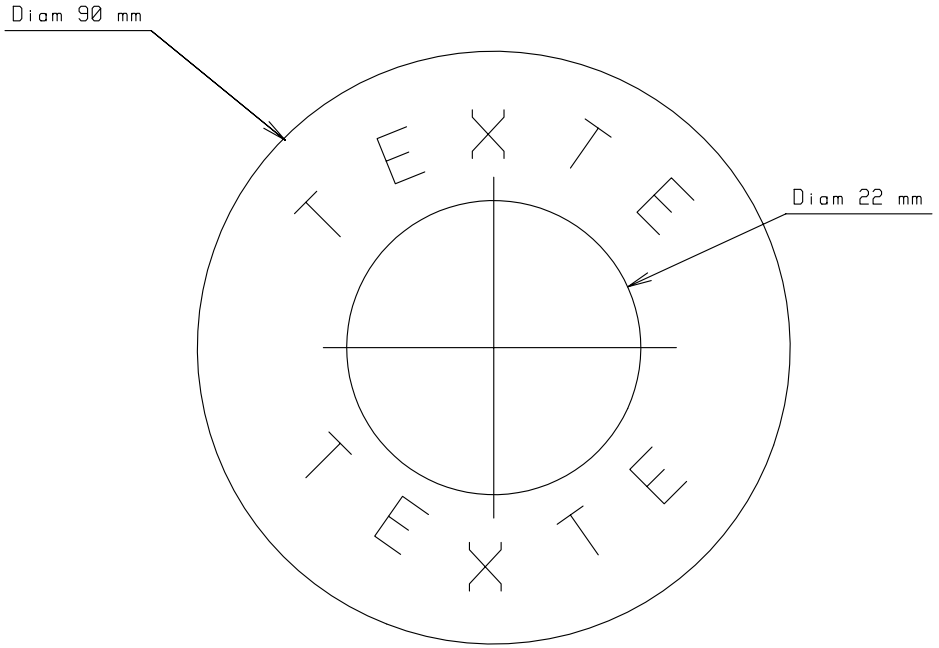
FORMAT A1

TEXTE NOIR
AU FORMAT "SIMPLE"
SUR FOND BLANC



FORMAT A2

TEXTE NOIR
AU FORMAT "SIMPLE"
SUR FOND JAUNE



FORMAT A3

TEXTE NOIR
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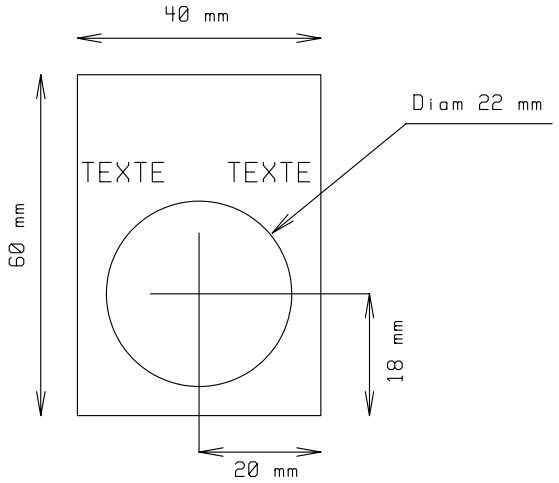
SUR FOND BLANC



TOUTE LES ETIQUETTES DOIVENT ETRE COLLEES

CES FORMATS D'ETIQUETTE CORRESPONDENT
AUX FORMATS TELEMECANIQUE

VESUVIUS SYSTEMS
Rue de Douvrain, 17
B-7011 GHLIN (BELGIQUE)
Tél.: (32) 65 40 08 10

	BY	DATE	SIGN
DRAWN	DVT	11-12-2006	
CHECKED	DBE	11-12-2006	
APPROVED	DBE	11-12-2006	

LABELS

IND	DATE	MODIFICATION	BY
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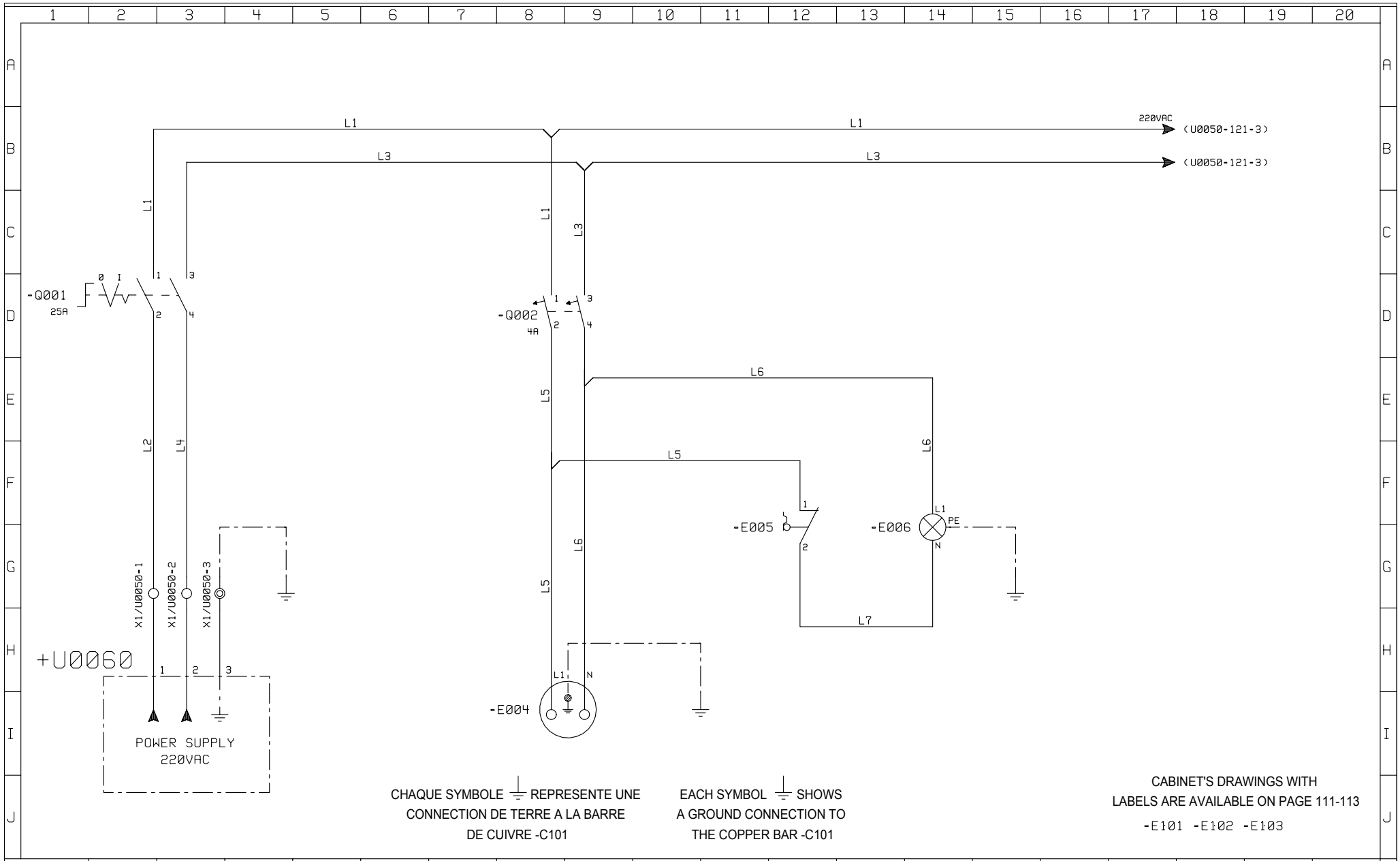

CHAQUE SYMBOLE ⏚ REPRESENTE UNE CONNECTION DE TERRE A LA BARRE DE CUIVRE -C101

EACH SYMBOL ⏚ SHOWS A GROUND CONNECTION TO THE COPPER BAR -C101

CABINET'S DRAWINGS WITH LABELS ARE AVAILABLE ON PAGE 111-113

-E101 -E102 -E103

VESUVIUS SYSTEMS
Rue de Douvrain, 17
B-7011 GHLIN (BELGIQUE)
Tél.: (32) 65 40 08 10

	BY	DATE	SIGN
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APPROVED	DBE	11-12-2006	

P.S 220VAC

+U0050/U0060

IND	DATE	MODIFICATION	BY
0	11-12-2006		DVT

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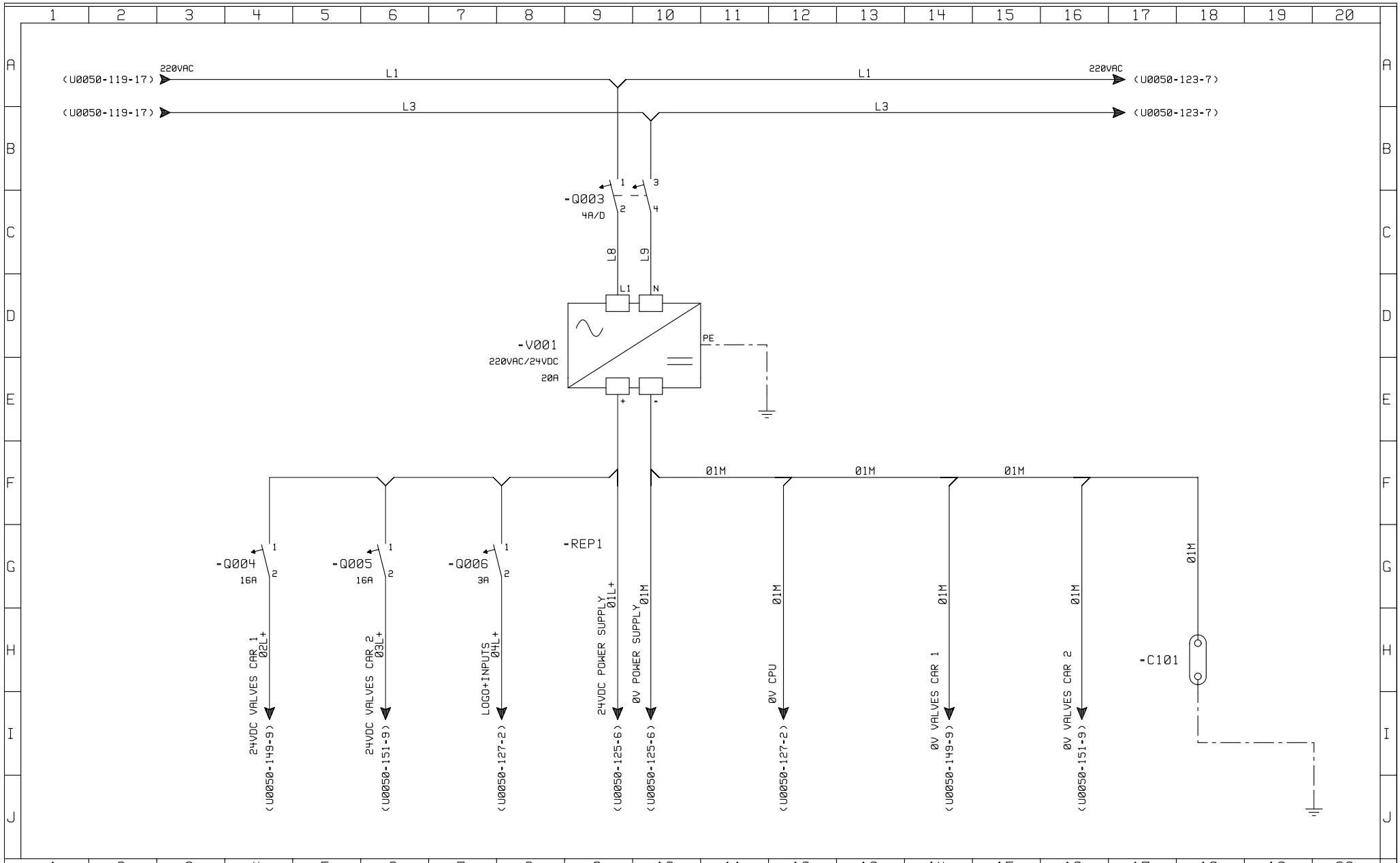
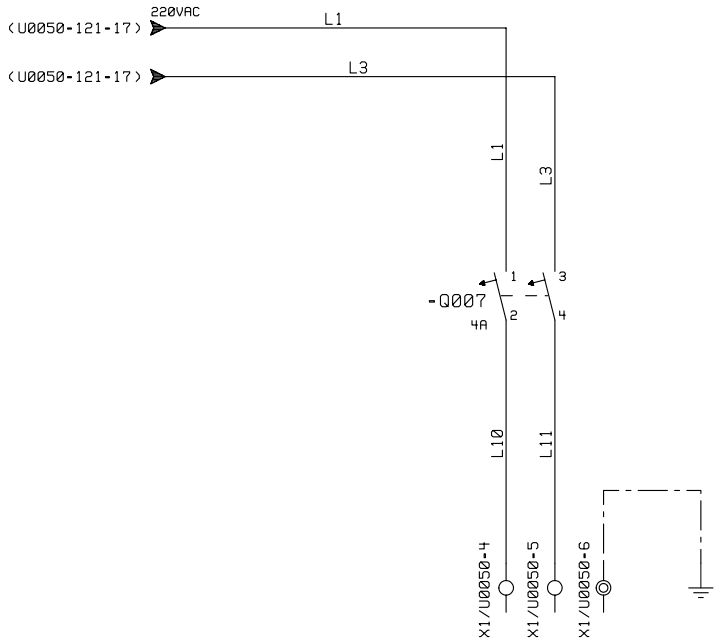
C.N.C



VESUVIUS SYSTEMS Rue de Douvrain, 17 B-7011 GHLIN (BELGIQUE) Tél.: (32) 65 40 08 10		BY	DATE	SIGN	P.S 24VDC	IND	DATE	MODIFICATION	BY	ENAKIEVO 61113
	DRAWN	DVT	11-12-2006			0	11-12-2006		DVT	
	CHECKED	DBE	11-12-2006		+U0050					C.N.C
	APPROVED	DBE	11-12-2006							PAGE : 121



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VESUVIUS SYSTEMS
Rue de Douvrain, 17
B-7011 GHLIN (BELGIQUE)
Tél.: (32) 65 40 08 10

	BY	DATE	SIGN
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POWER SUPPLY SPARE

+U0050

IND	DATE	MODIFICATION	BY
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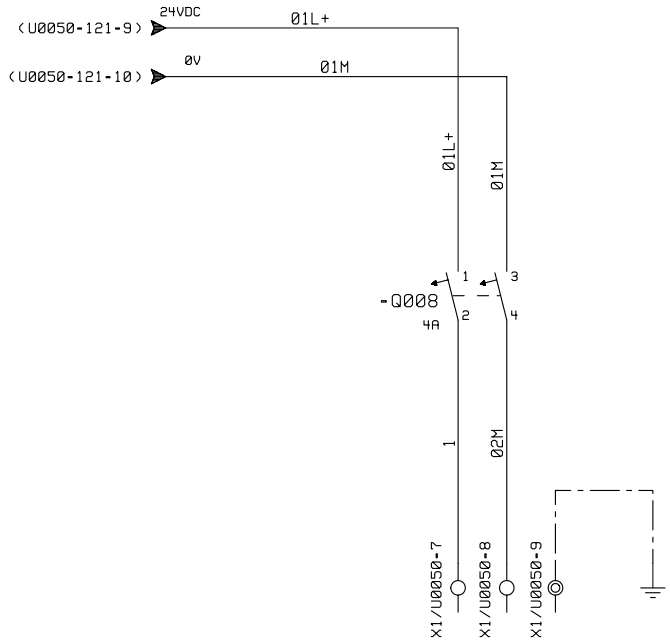

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A	B	C	D	E	F	G	H	I	J										

VESUVIUS SYSTEMS
Rue de Douvrain, 17
B-7011 GHLIN (BELGIQUE)
Tél.: (32) 65 40 08 10

	BY	DATE	SIGN
DRAWN	DVT	11-12-2006	
CHECKED	DBE	11-12-2006	
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POWER SUPPLY SPARE

+U0050

IND	DATE	MODIFICATION	BY
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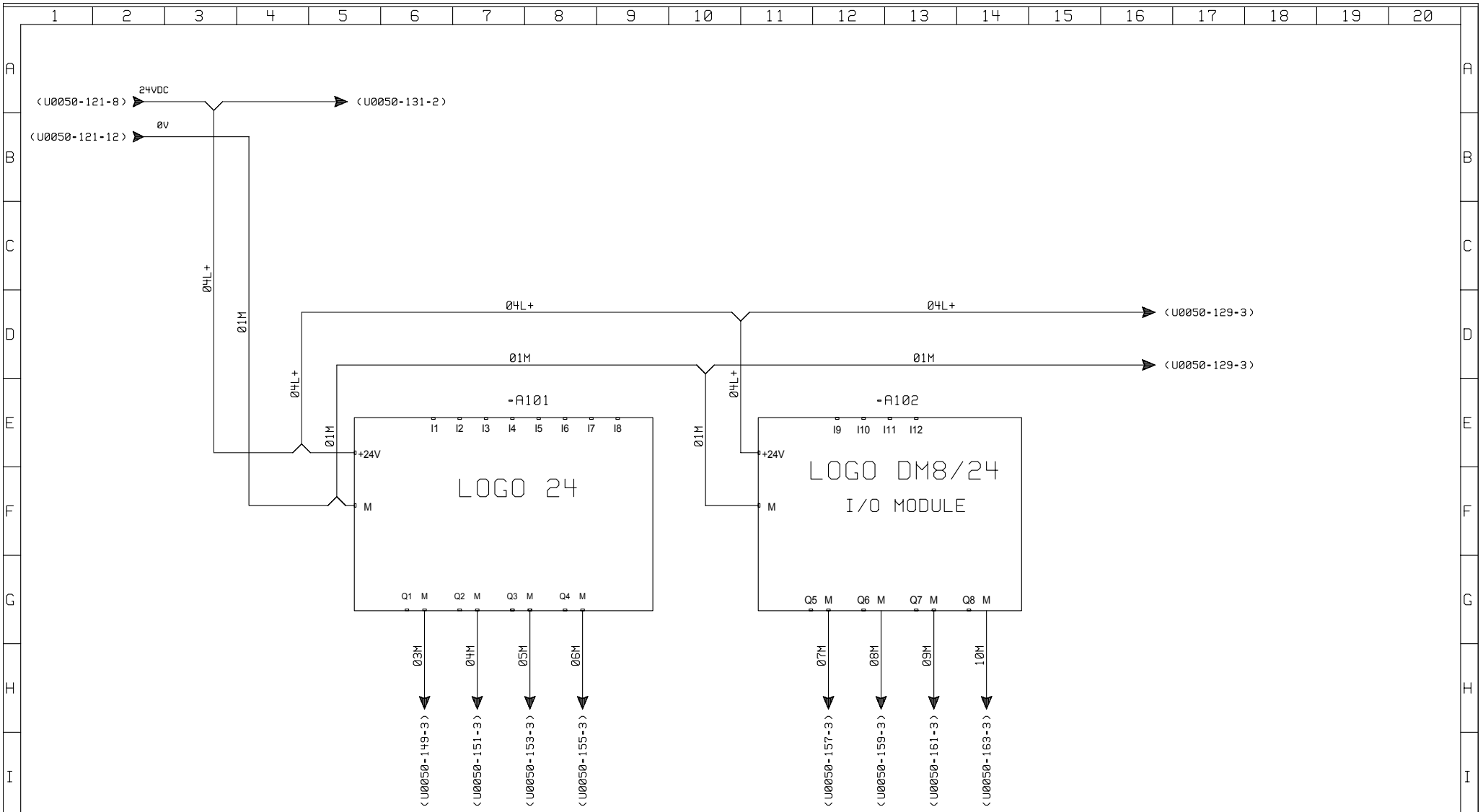

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VESUVIUS SYSTEMS
Rue de Douvrain, 17
B-7011 GHLIN (BELGIQUE)
Tél.: (32) 65 40 08 10

	BY	DATE	SIGN
DRAWN	DVT	11-12-2006	
CHECKED	DBE	11-12-2006	
APPROVED	DBE	11-12-2006	

POWER SUPPLY LOGO

+U0050

IND	DATE	MODIFICATION	BY
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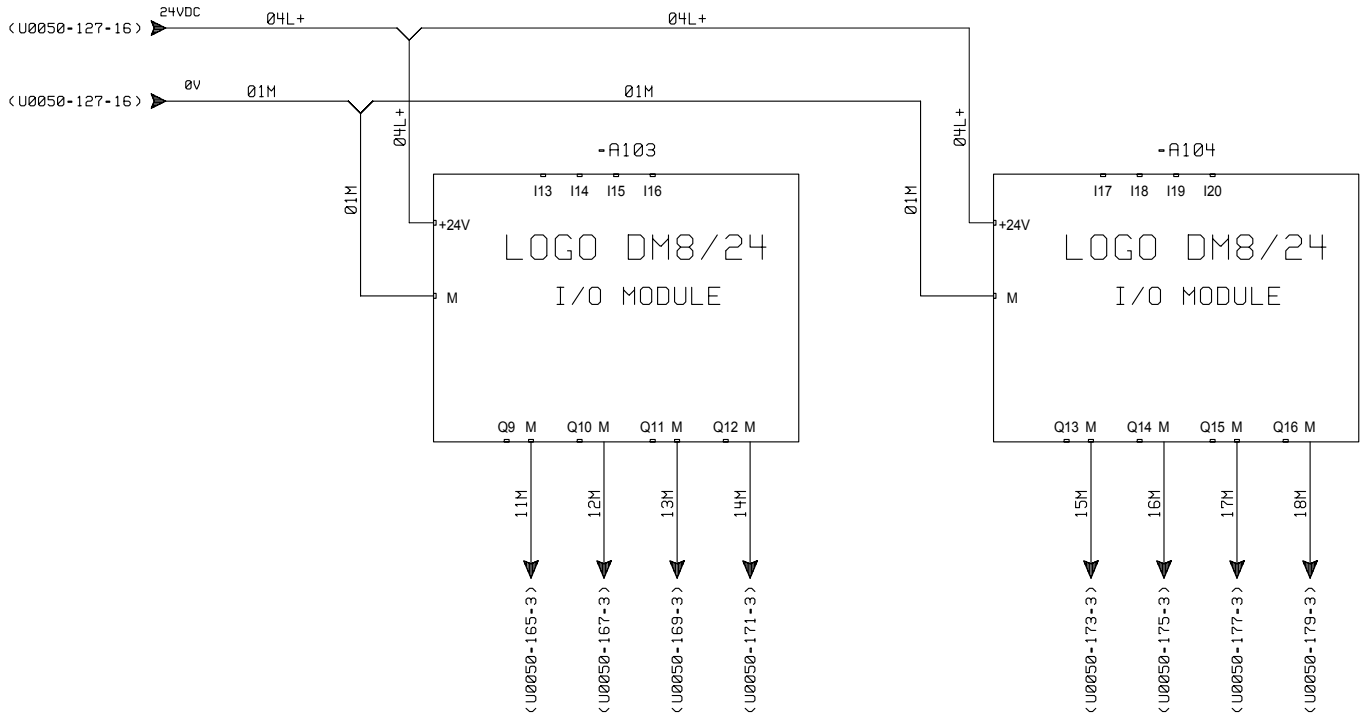

VESUVIUS SYSTEMS
Rue de Douvrain, 17
B-7011 GHLIN (BELGIQUE)
Tél.: (32) 65 40 08 10

	BY	DATE	SIGN
DRAWN	DVT	11-12-2006	
CHECKED	DBE	11-12-2006	
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POWER SUPPLY LOGO

+U0050

IND	DATE	MODIFICATION	BY
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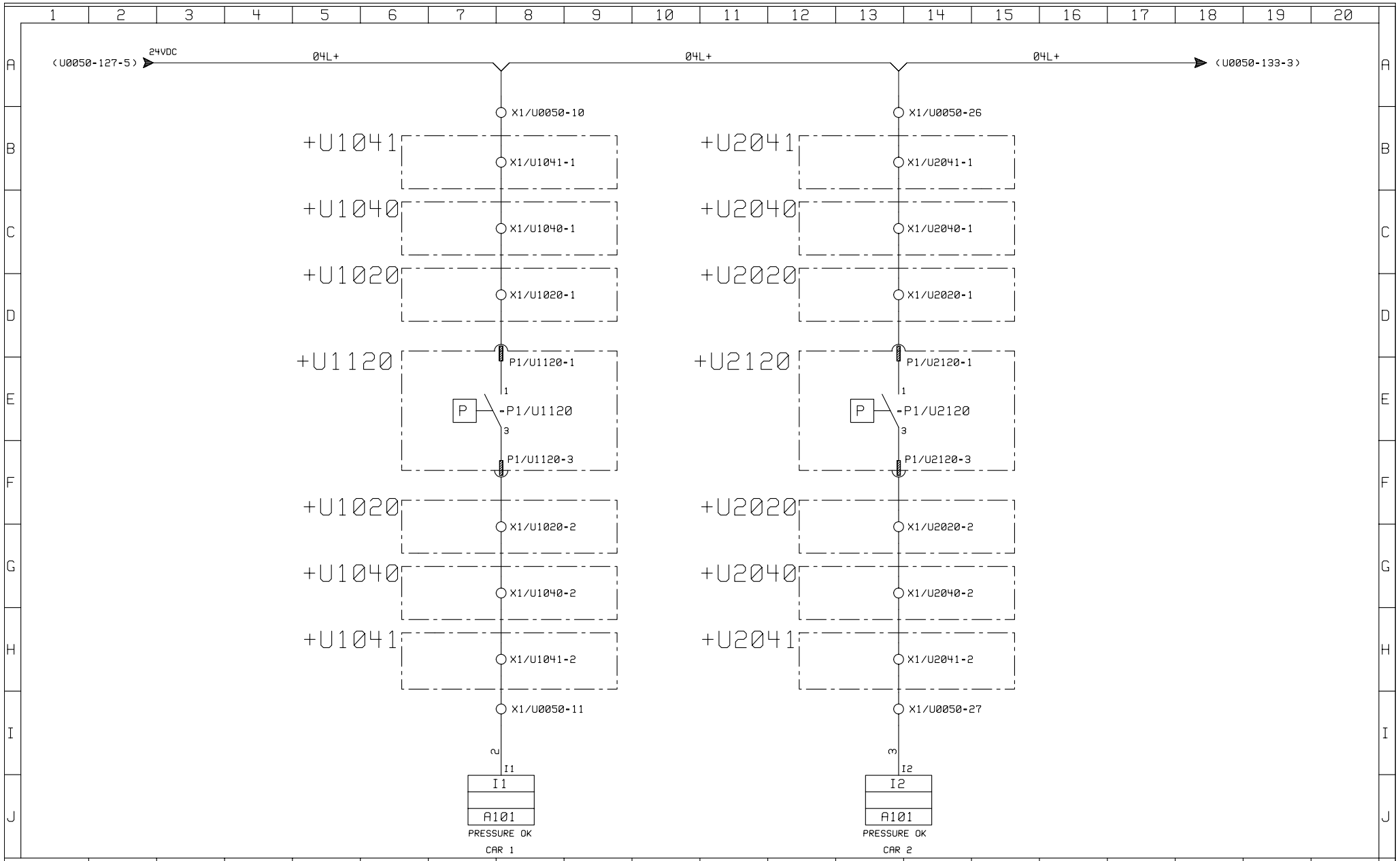
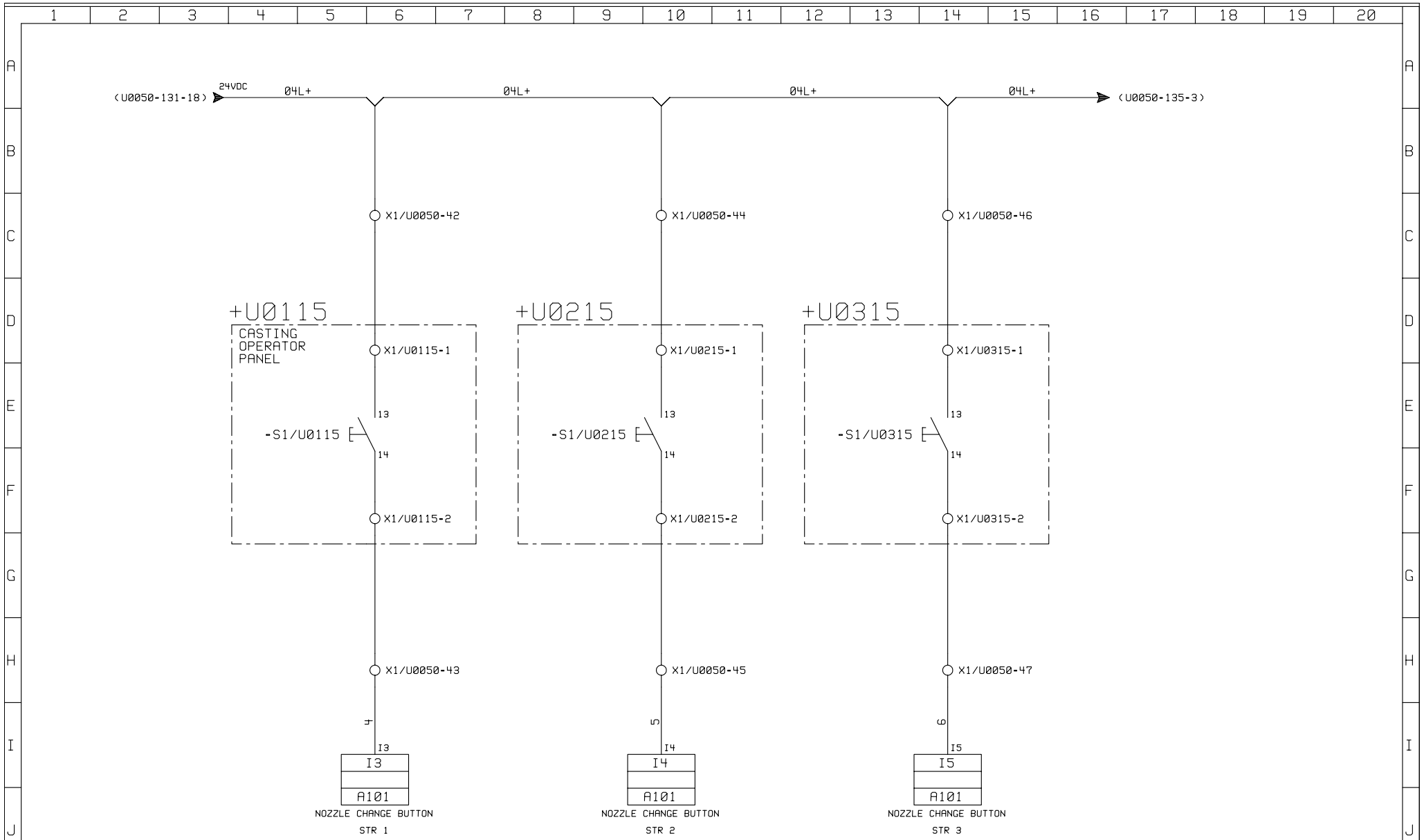


VESUVIUS SYSTEMS Rue de Douvrain, 17 B-7011 GHLIN (BELGIQUE) Tél.: (32) 65 40 08 10		BY	DATE	SIGN	D.I:PRESSURE OK	IND	DATE	MODIFICATION	BY	ENAKIEVO 61113
	DRAWN	DVT	11-12-2006			0	11-12-2006		DVT	
	CHECKED	DBE	11-12-2006		+U0050/i120/i020/i040/i041					C.N.C
	APPROVED	DBE	11-12-2006							PAGE : 131



VESUVIUS SYSTEMS
Rue de Douvrain, 17
B-7011 GHLIN (BELGIQUE)
Tél.: (32) 65 40 08 10

	BY	DATE	SIGN
DRAWN	DVT	11-12-2006	
CHECKED	DBE	11-12-2006	
APPROVED	DBE	11-12-2006	

D.I:BUTTONS OP

+U0050/U0j15

IND	DATE	MODIFICATION	BY
0	11-12-2006		DVT

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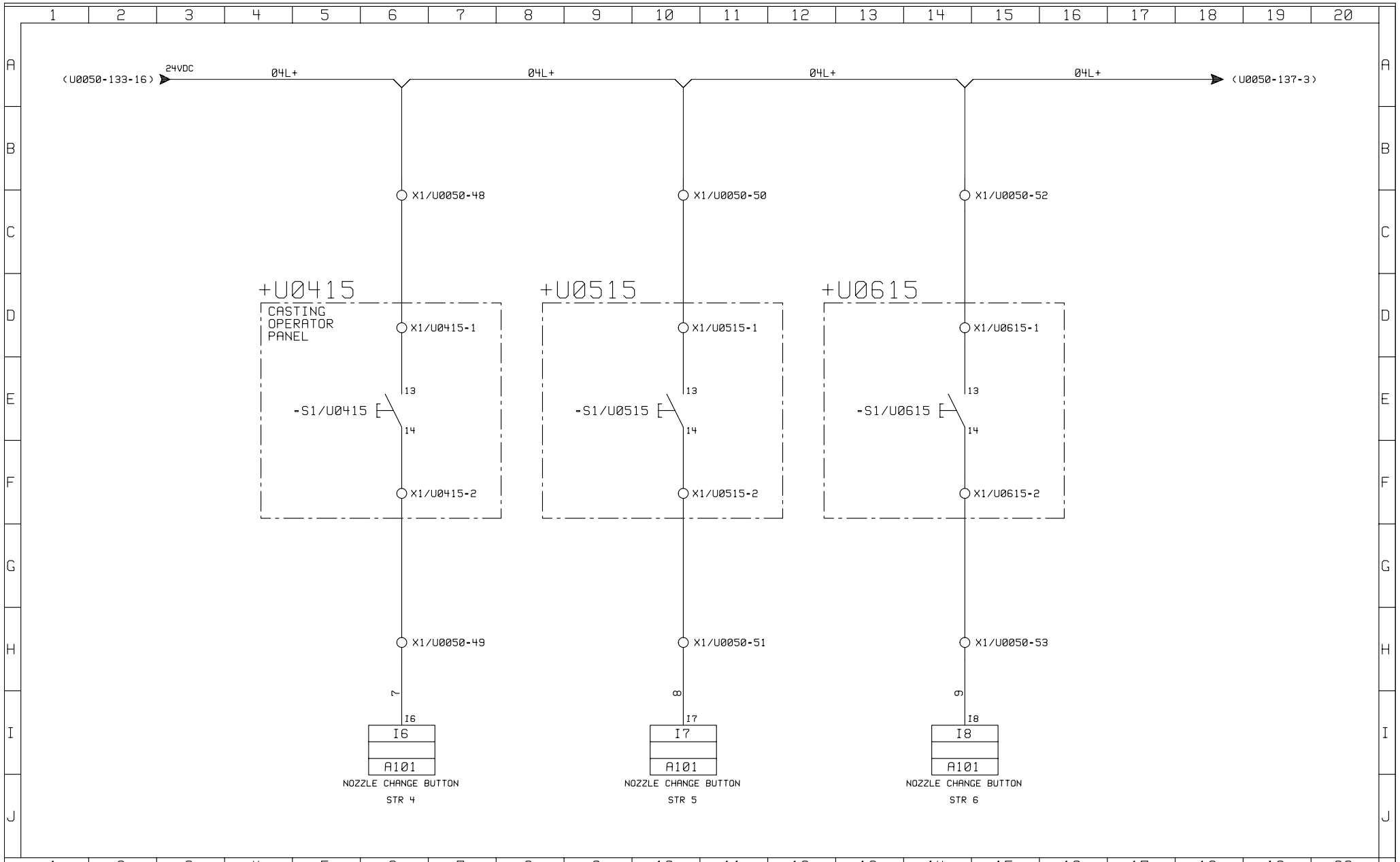

VESUVIUS SYSTEMS
Rue de Douvrain, 17
B-7011 GHLIN (BELGIQUE)
Tél.: (32) 65 40 08 10

	BY	DATE	SIGN
DRAWN	DVT	11-12-2006	
CHECKED	DBE	11-12-2006	
APPROVED	DBE	11-12-2006	

D.I:BUTTONS OP

+U0050/U0j15

IND	DATE	MODIFICATION	BY
0	11-12-2006		DVT

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C.N.C

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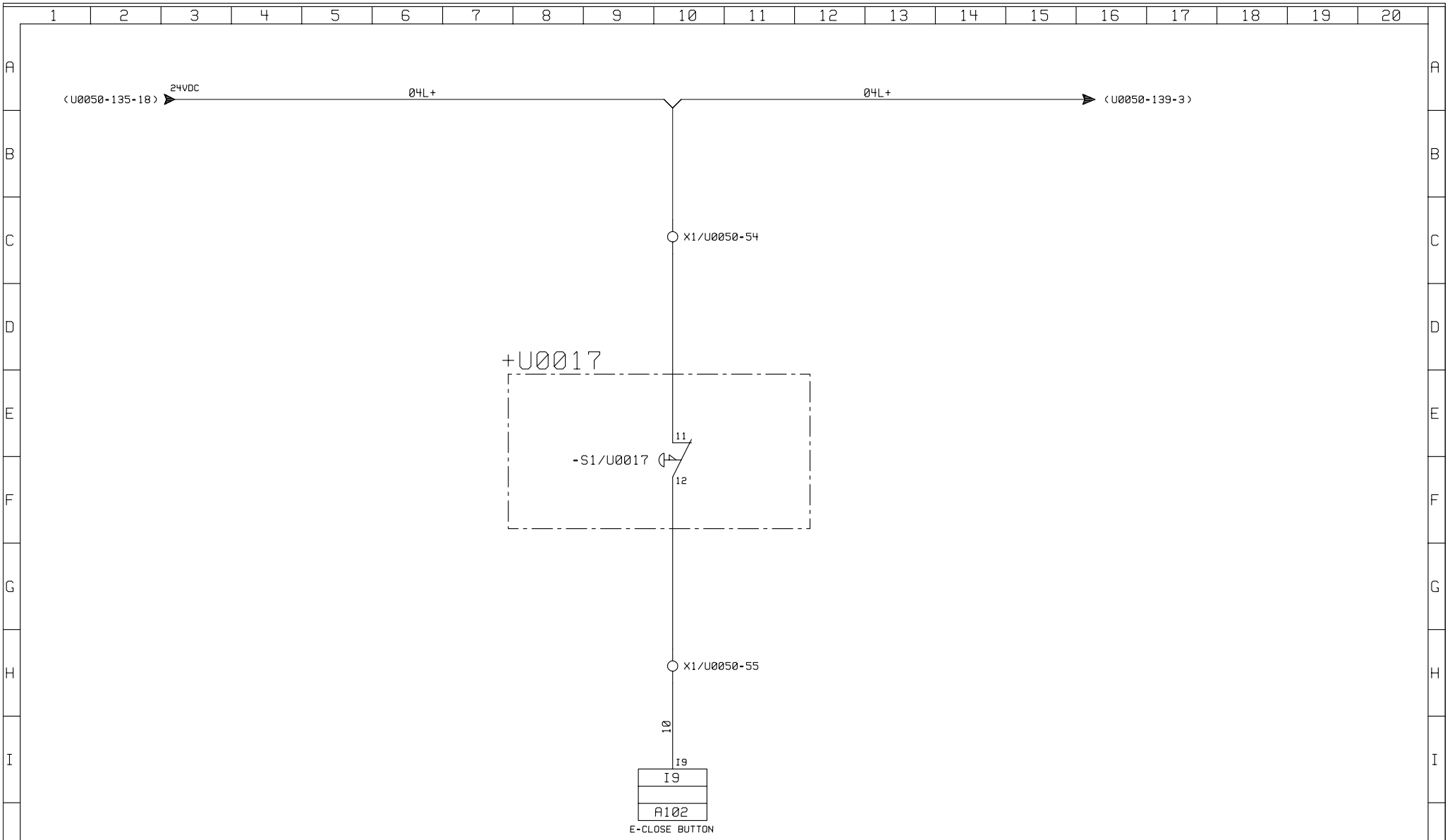

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VESUVIUS SYSTEMS
Rue de Douvrain, 17
B-7011 GHLIN (BELGIQUE)
Tél.: (32) 65 40 08 10

	BY	DATE	SIGN
DRAWN	DVT	11-12-2006	
CHECKED	DBE	11-12-2006	
APPROVED	DBE	11-12-2006	

D.I:E-CLOSE BUTTON

+U0050/U0017

IND	DATE	MODIFICATION	BY
0	11-12-2006		DVT

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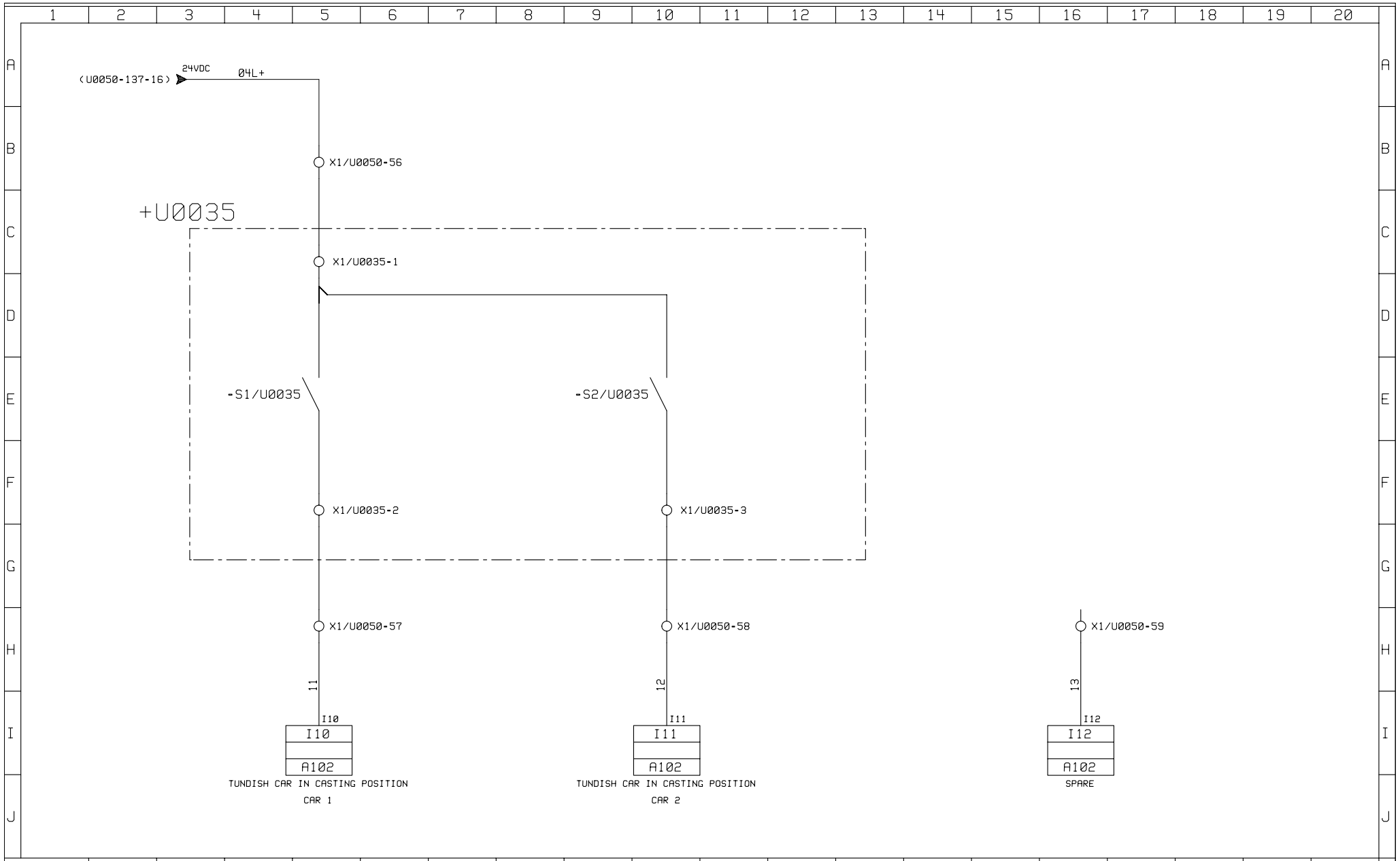

VESUVIUS SYSTEMS
Rue de Douvrain, 17
B-7011 GHLIN (BELGIQUE)
Tél.: (32) 65 40 08 10

	BY	DATE	SIGN
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CHECKED	DBE	11-12-2006	
APPROVED	DBE	11-12-2006	

D.I: INTERFACE+SPARE

+U0050/U0035

IND	DATE	MODIFICATION	BY
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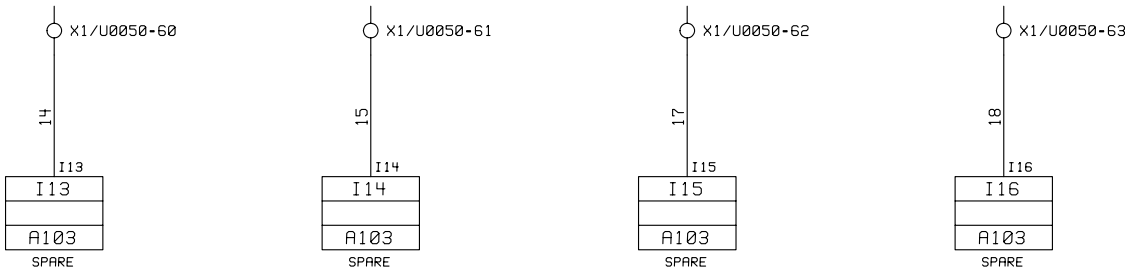
C.N.C



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VESUVIUS SYSTEMS
Rue de Douvrain, 17
B-7011 GHLIN (BELGIQUE)
Tél.: (32) 65 40 08 10

	BY	DATE	SIGN
DRAWN	DVT	11-12-2006	
CHECKED	DBE	11-12-2006	
APPROVED	DBE	11-12-2006	

D.I:SPARE

+U0050

IND	DATE	MODIFICATION	BY
0	11-12-2006		DVT

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C.N.C

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VESUVIUS SYSTEMS
Rue de Douvrain, 17
B-7011 GHLIN (BELGIQUE)
Tél.: (32) 65 40 08 10

	BY	DATE	SIGN
DRAWN	DVT	11-12-2006	
CHECKED	DBE	11-12-2006	
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D.I:SPARE

+U0050

IND	DATE	MODIFICATION	BY
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VESUVIUS SYSTEMS
Rue de Douvrain, 17
B-7011 GHLIN (BELGIQUE)
Tél.: (32) 65 40 08 10

	BY	DATE	SIGN
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CHECKED	DBE	11-12-2006	
APPROVED	DBE	11-12-2006	

SPARE

+U0050

IND	DATE	MODIFICATION	BY
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A																				A
B																				B
C																				C
D																				D
E																				E
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VESUVIUS SYSTEMS
Rue de Douvrain, 17
B-7011 GHLIN (BELGIQUE)
Tél.: (32) 65 40 08 10

	BY	DATE	SIGN
DRAWN	DVT	11-12-2006	
CHECKED	DBE	11-12-2006	
APPROVED	DBE	11-12-2006	

SPARE

+U0050

IND	DATE	MODIFICATION	BY
0	11-12-2006		DVT

ENAKIEVO
61113

C.N.C

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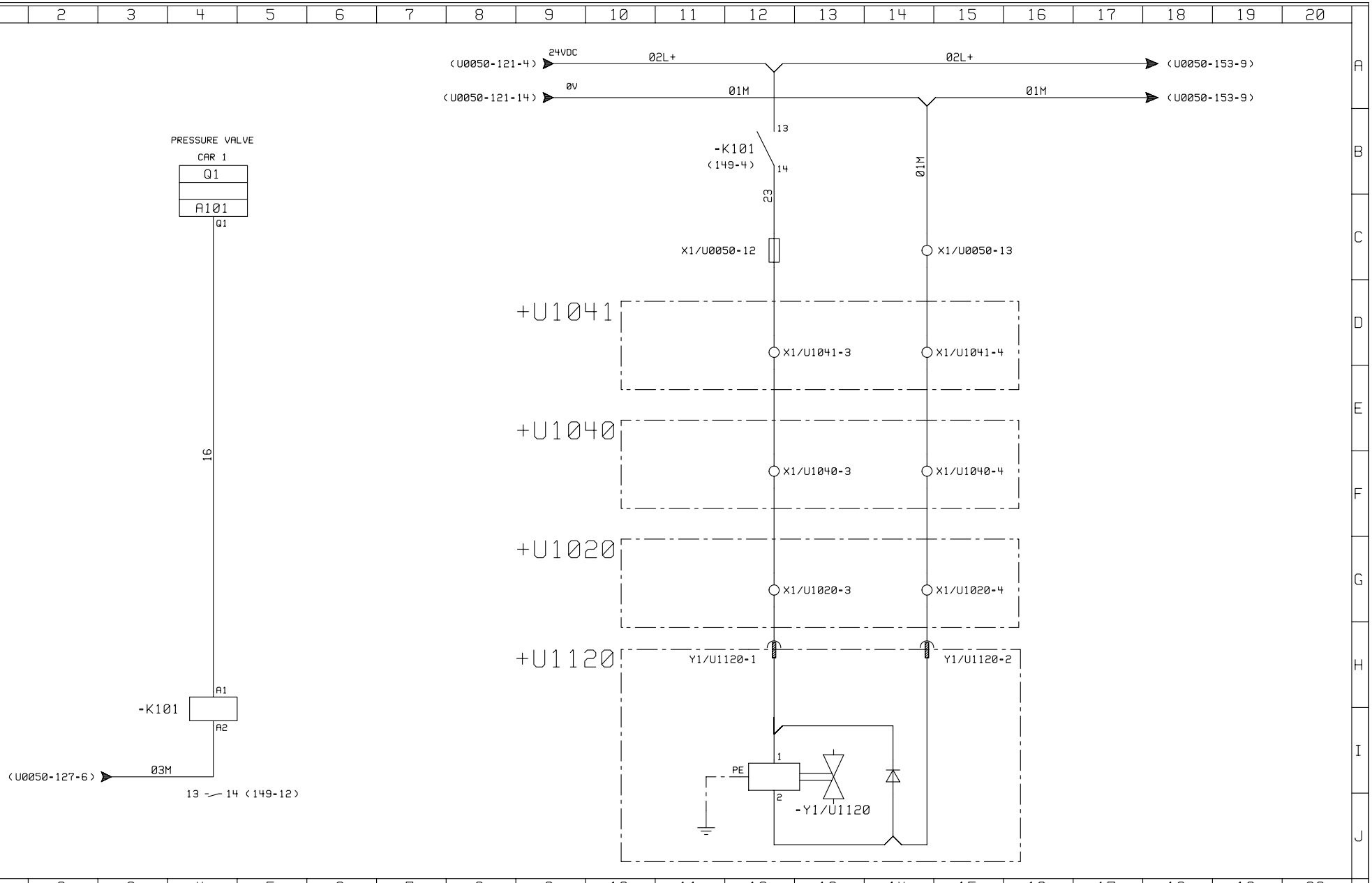

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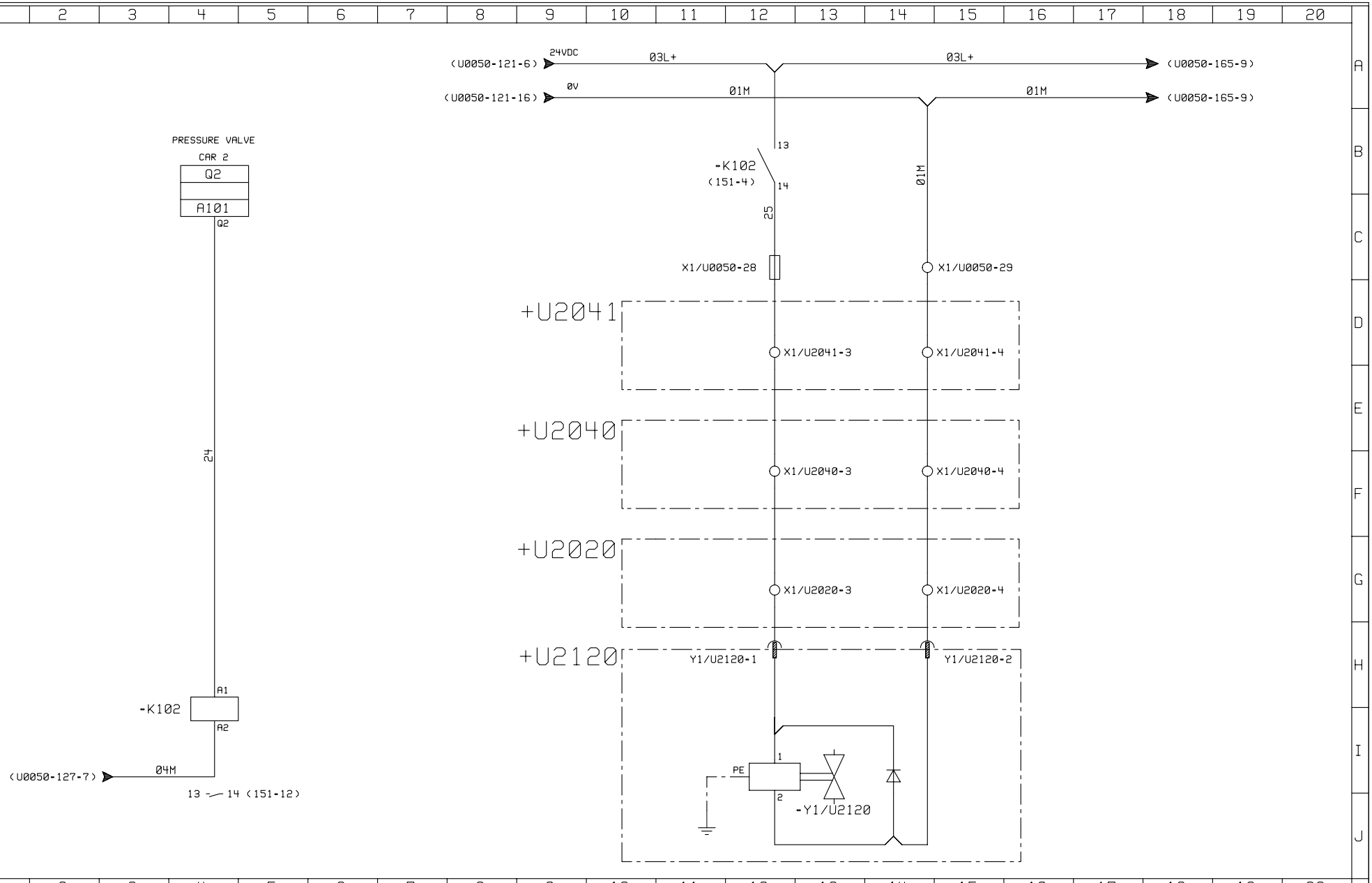

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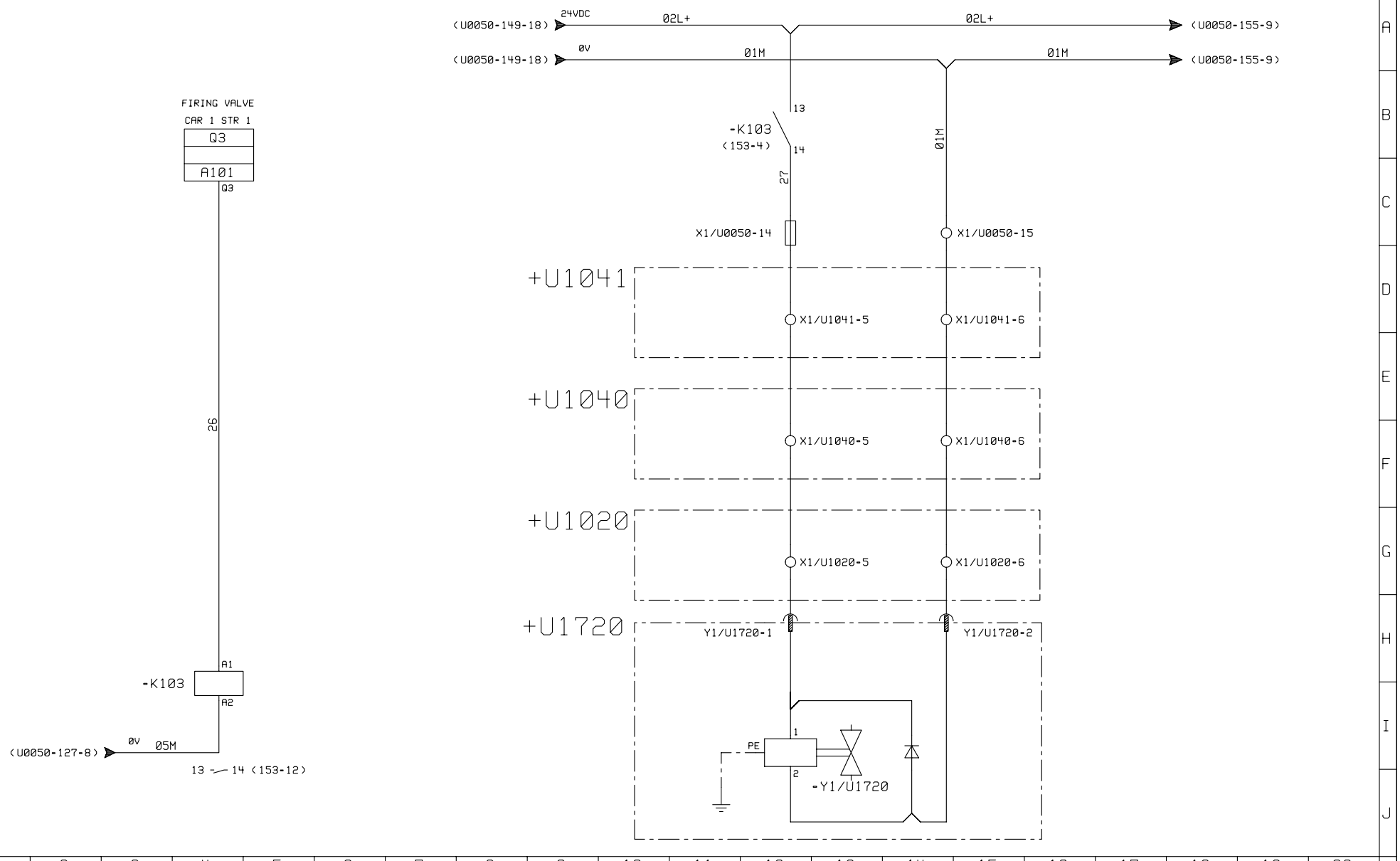

VESUVIUS SYSTEMS Rue de Douvrain, 17 B-7011 GHLIN (BELGIQUE) Tél.: (32) 65 40 08 10		BY	DATE	SIGN	D.O:FIR VALV CR1 STR1	IND	DATE	MODIFICATION	BY	ENAKIEVO 61113
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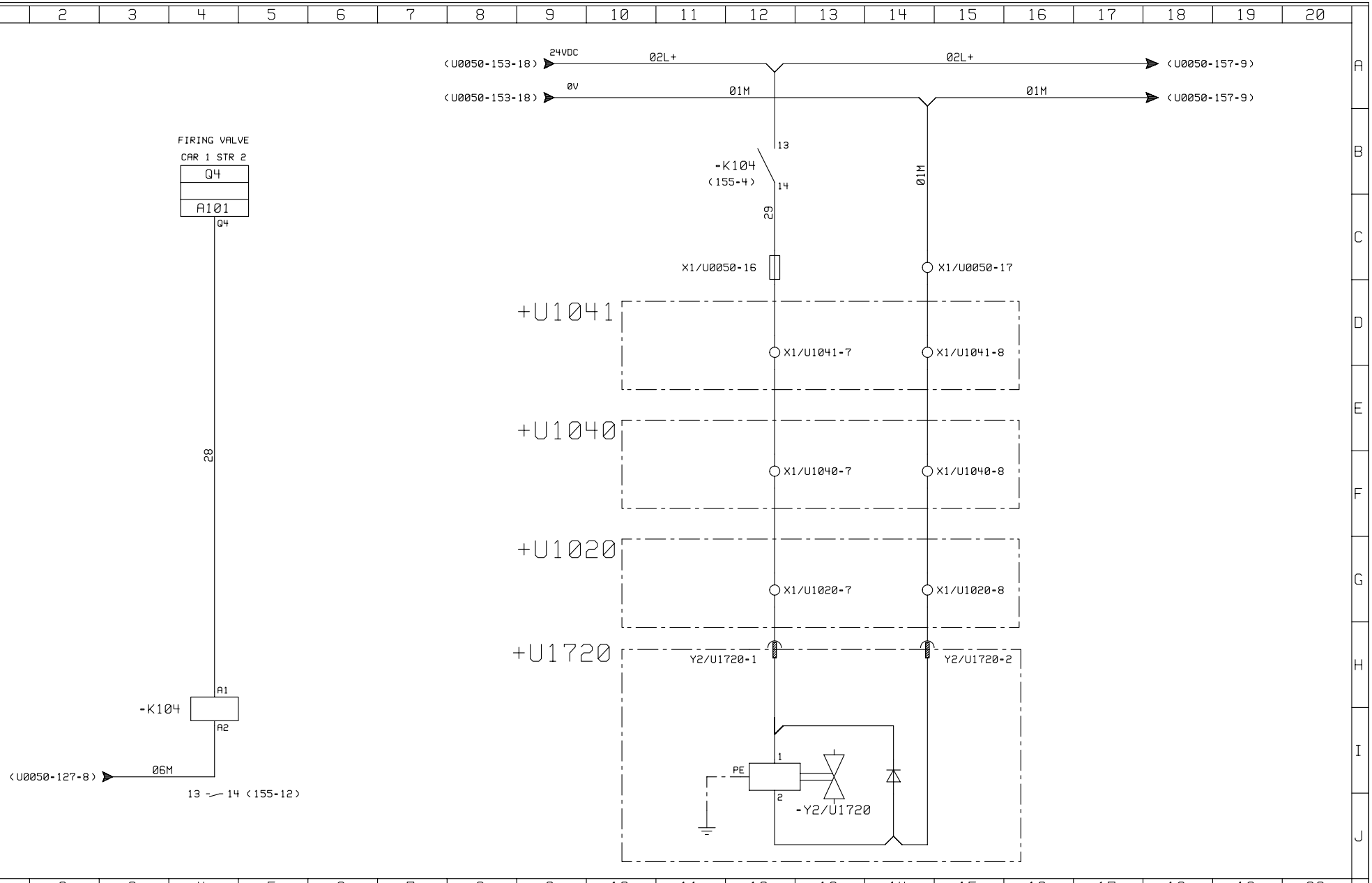

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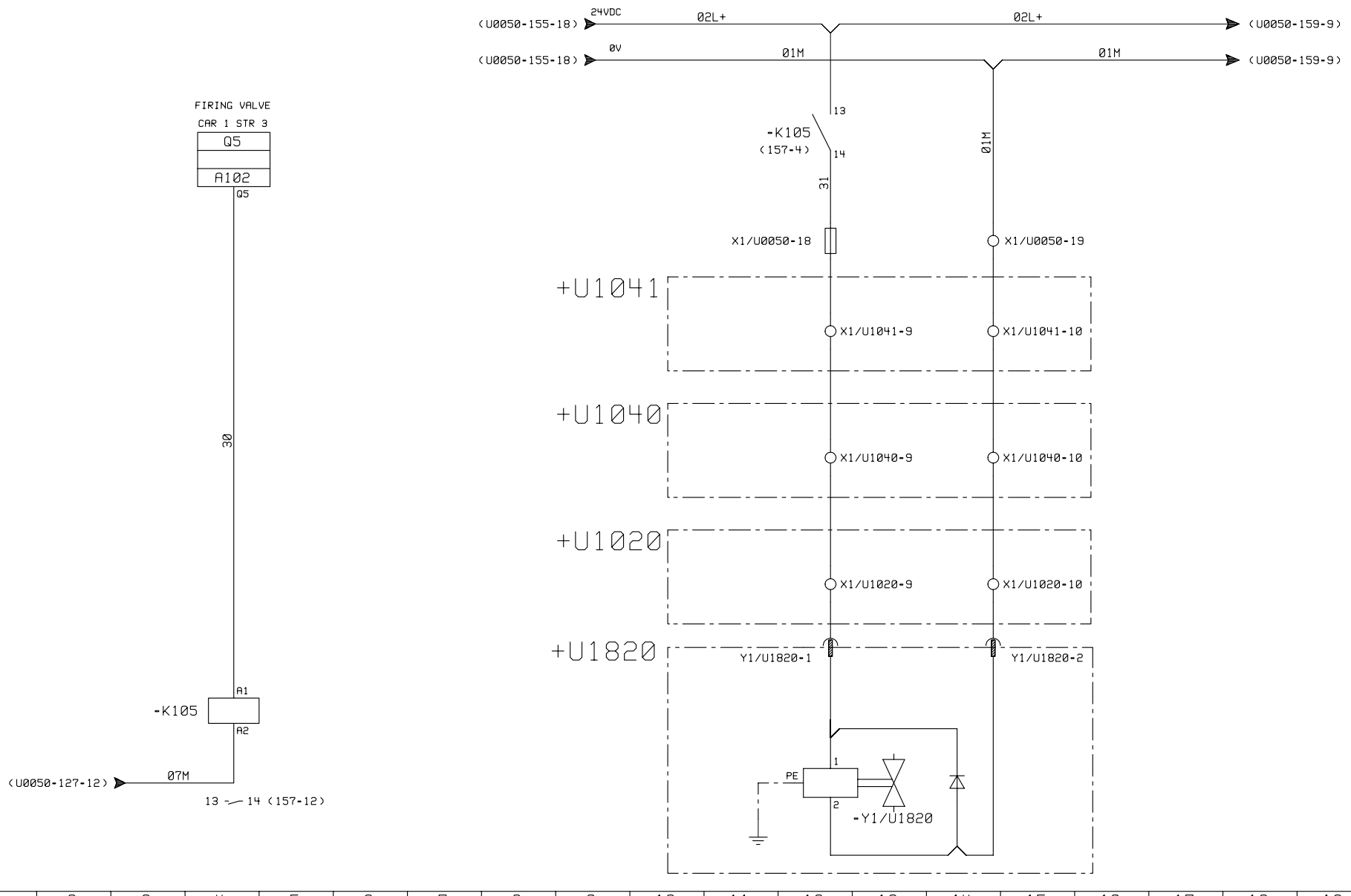

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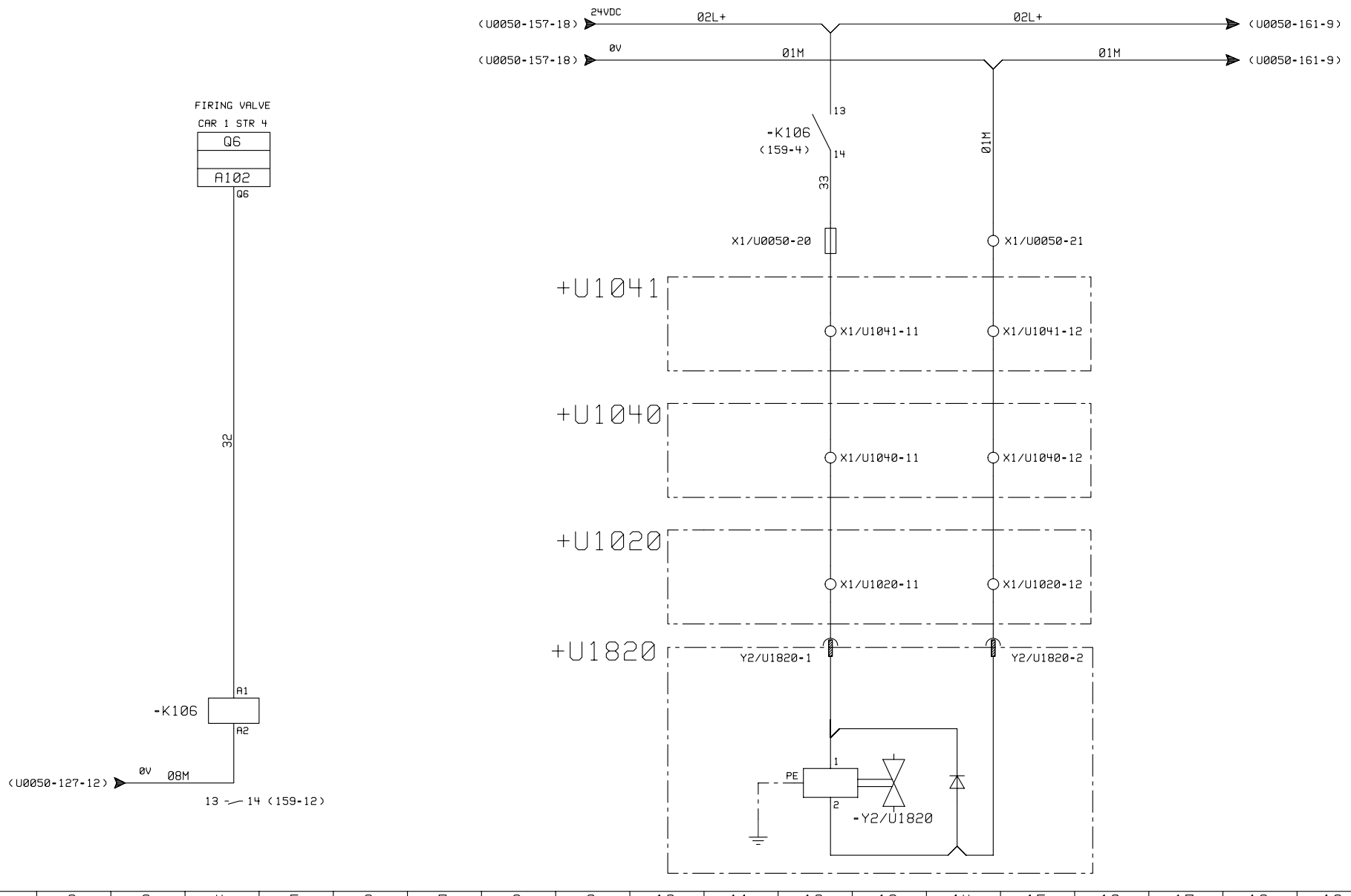

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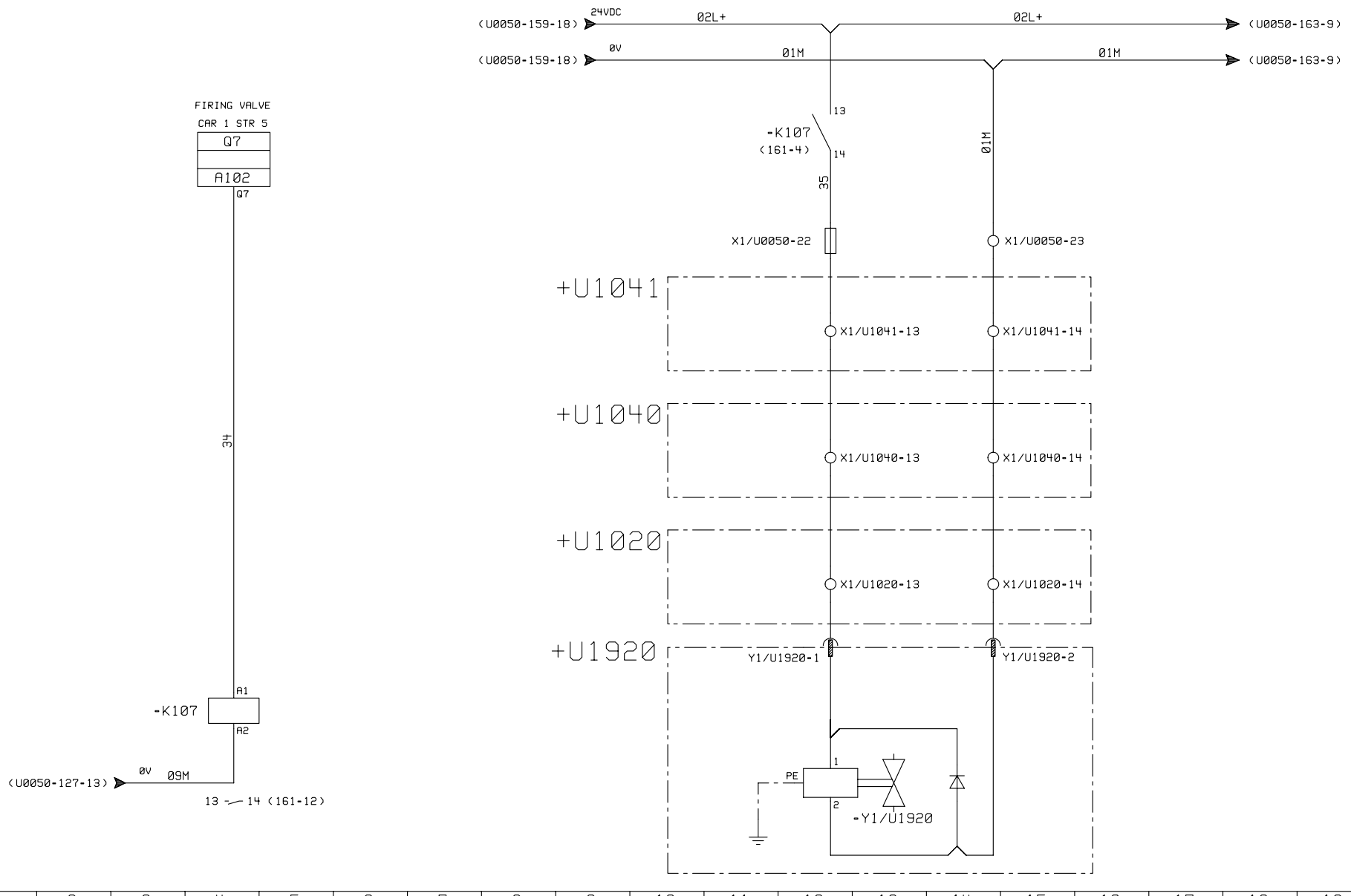

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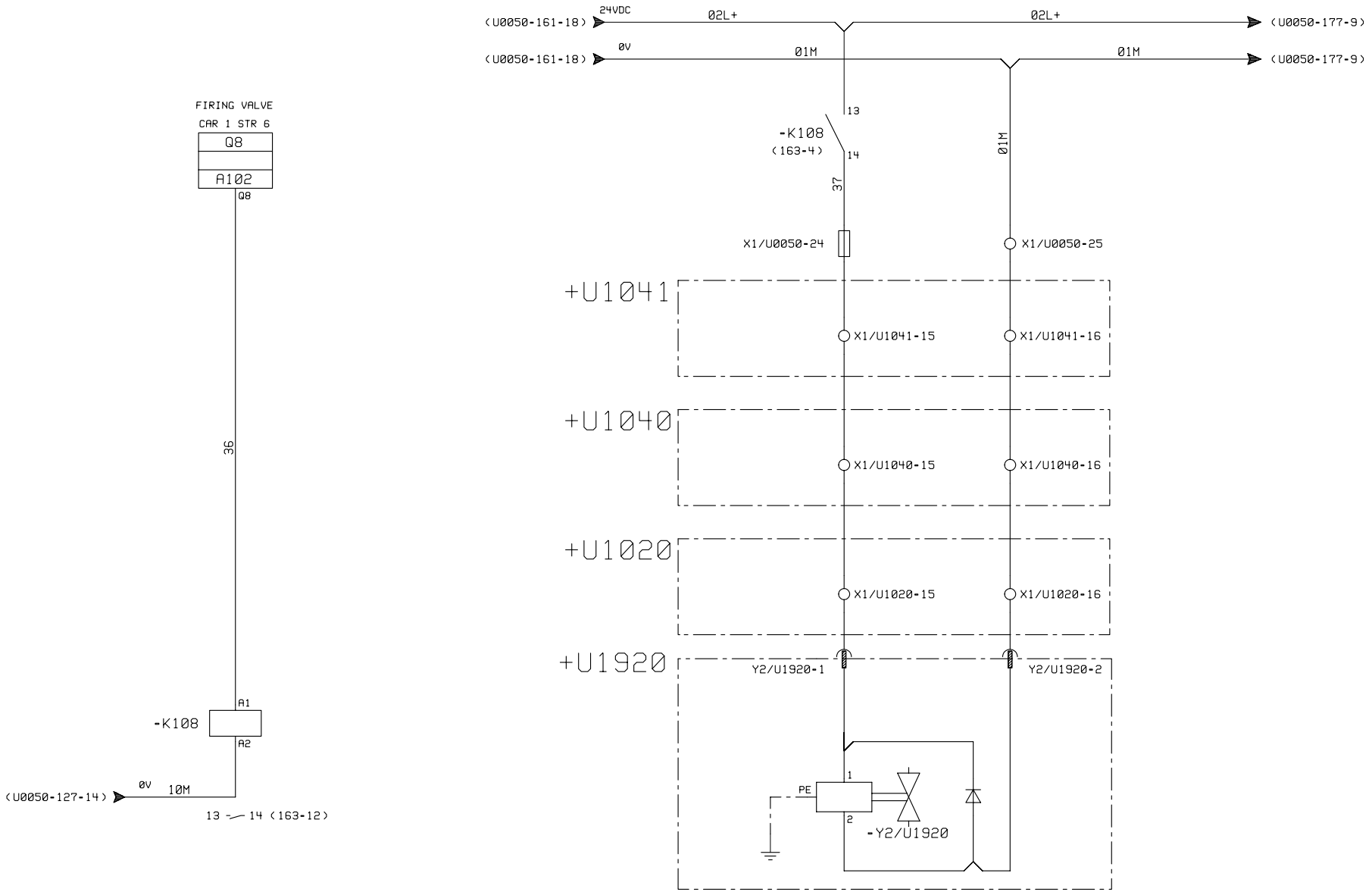

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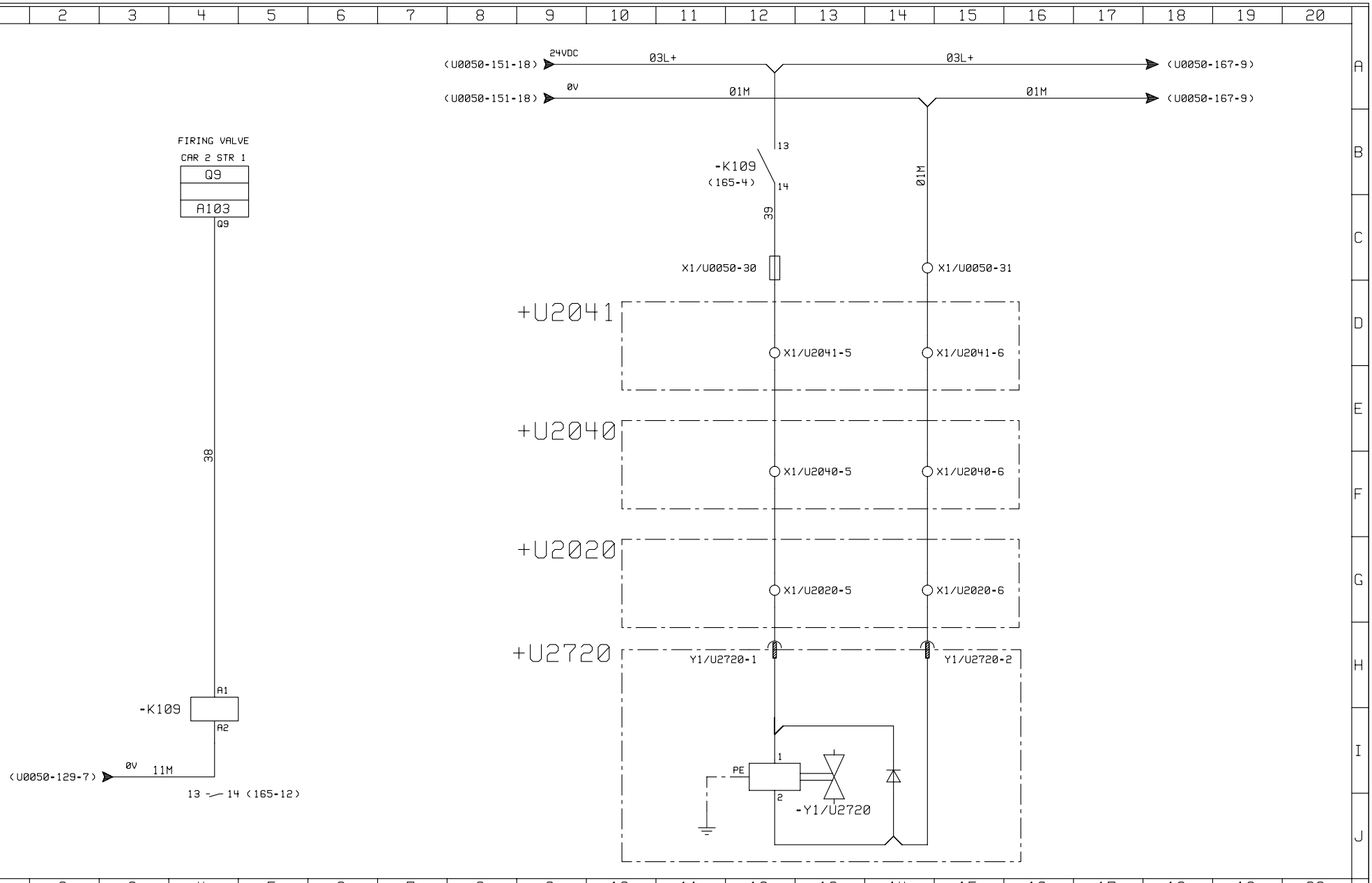

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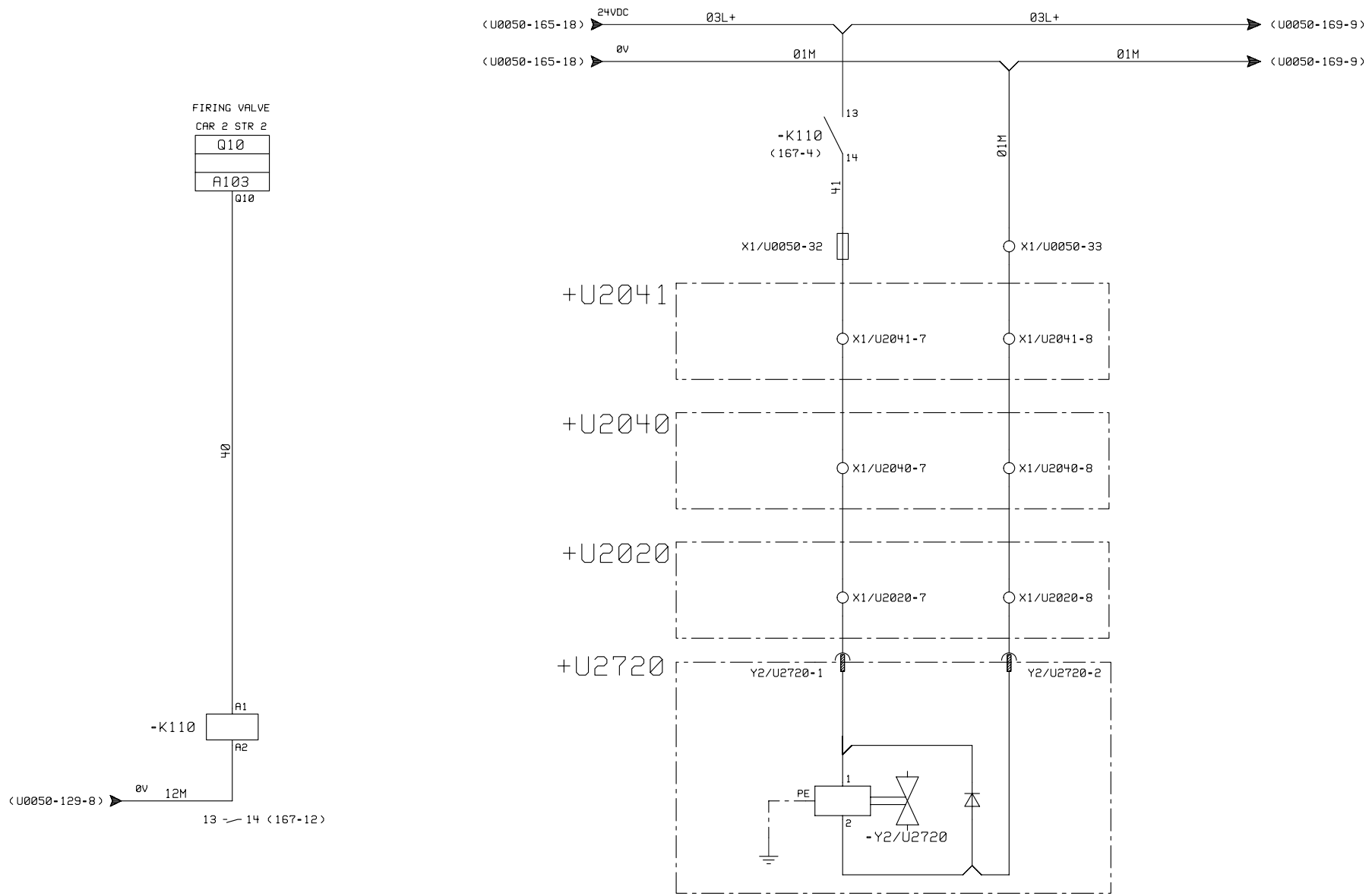

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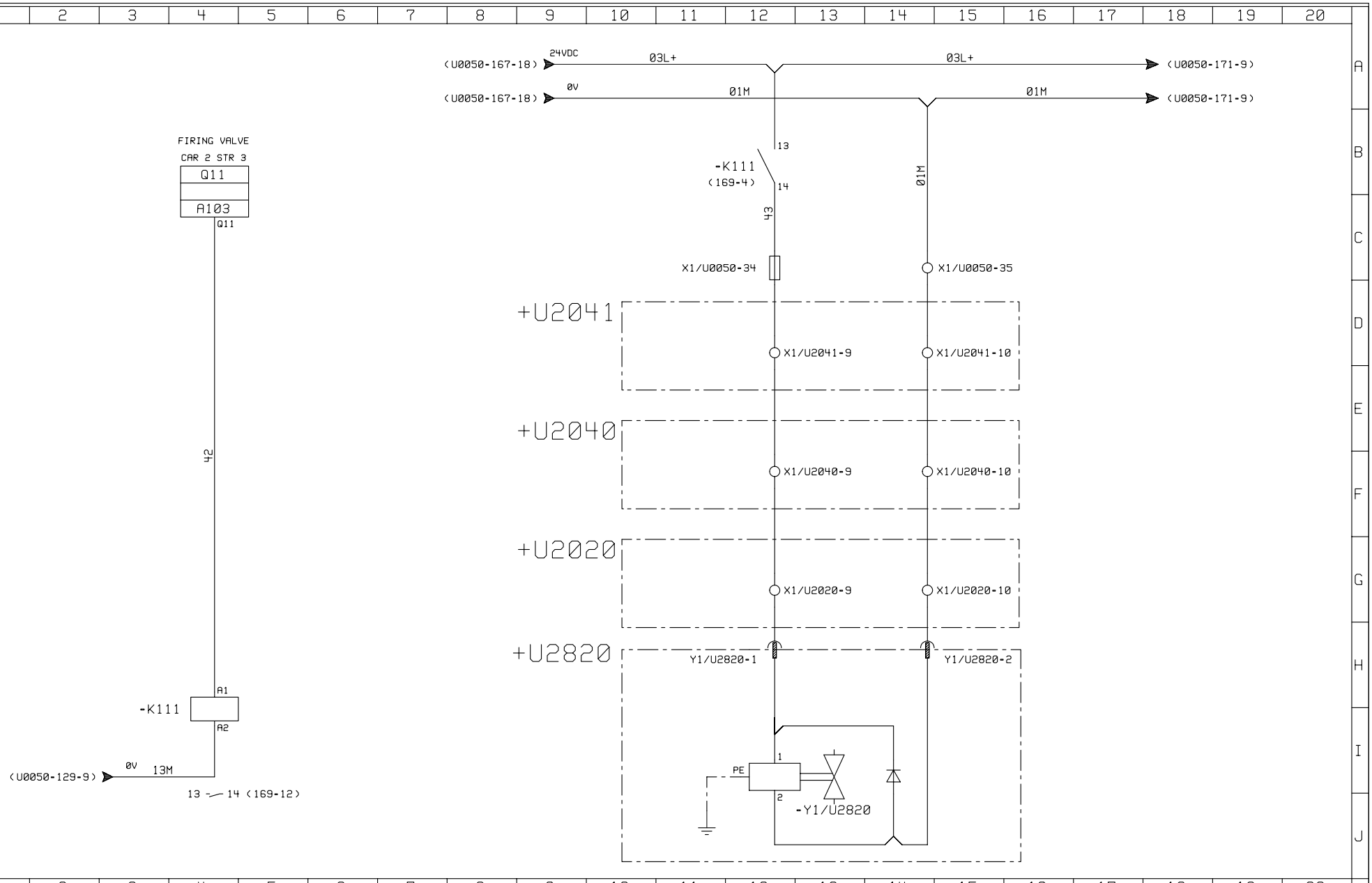

VESUVIUS SYSTEMS Rue de Douvrain, 17 B-7011 GHLIN (BELGIQUE) Tél.: (32) 65 40 08 10		BY	DATE	SIGN	D.O:FIR VALV CR2 STR3	IND	DATE	MODIFICATION	BY	ENAKIEVO 61113	
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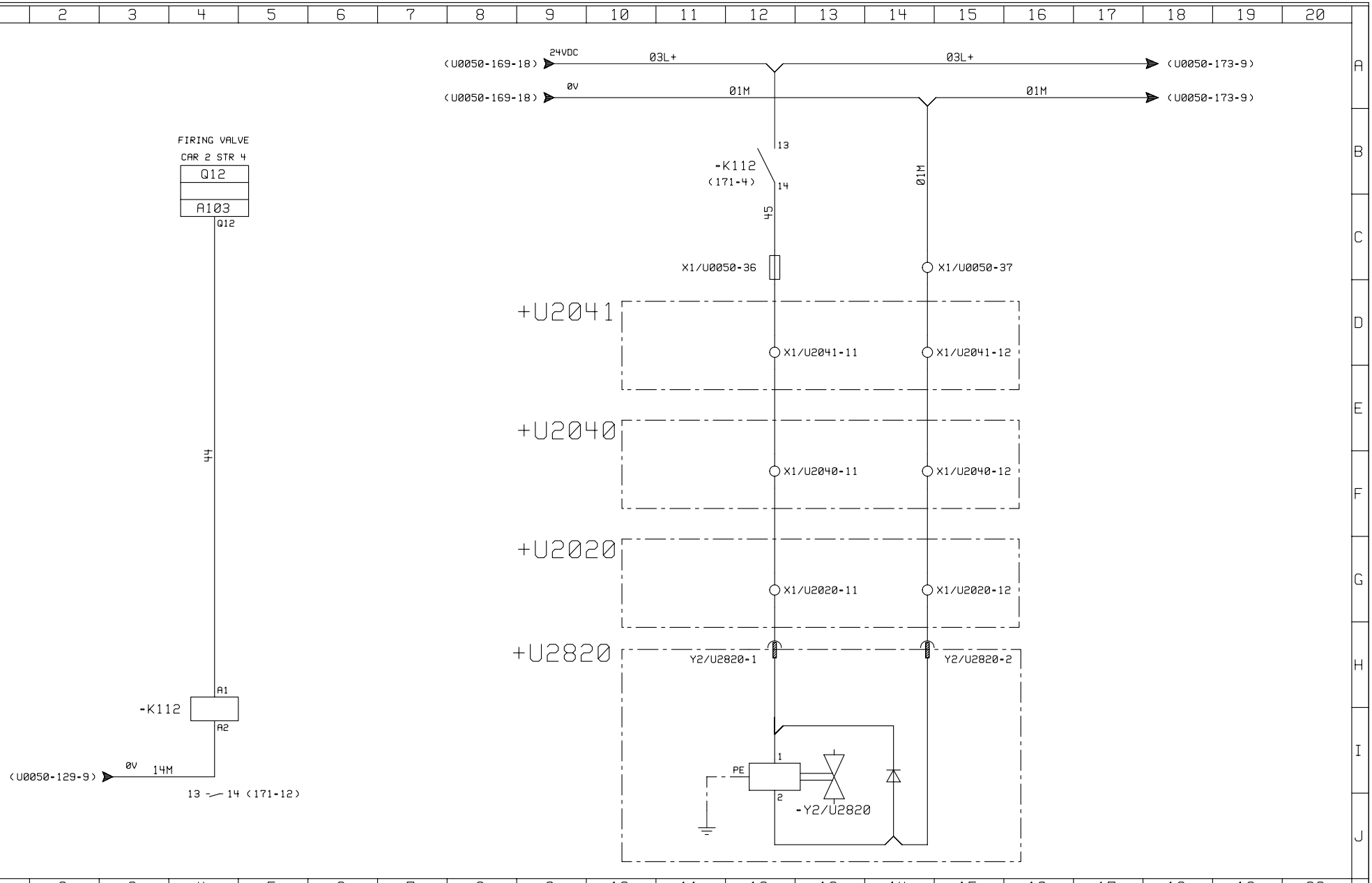

VESUVIUS SYSTEMS Rue de Douvrain, 17 B-7011 GHLIN (BELGIQUE) Tél.: (32) 65 40 08 10		BY	DATE	SIGN	D.O:FIR VALV CR2 STR4	IND	DATE	MODIFICATION	BY	ENAKIEVO 61113
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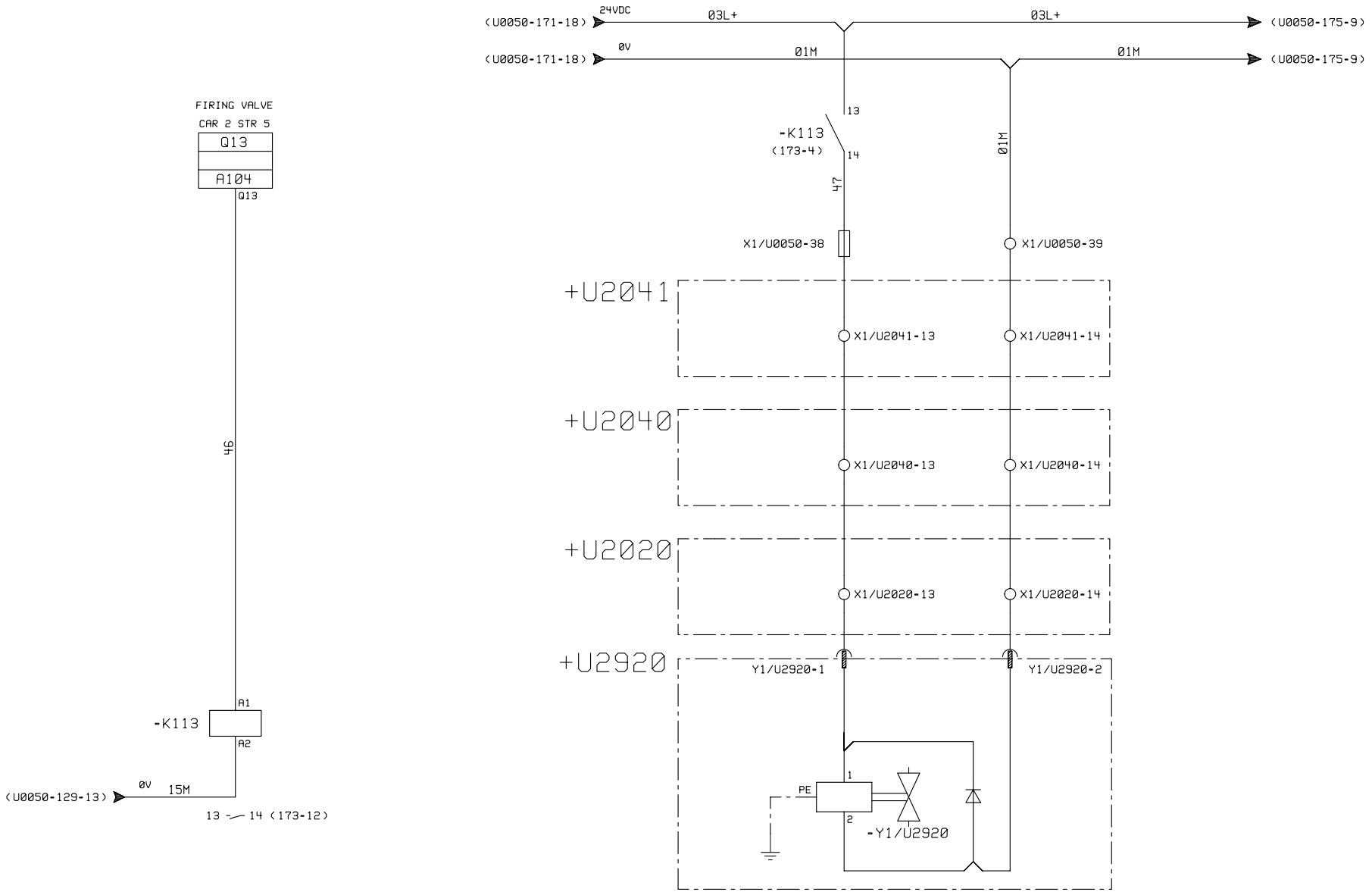

VESUVIUS SYSTEMS Rue de Douvrain, 17 B-7011 GHLIN (BELGIQUE) Tél.: (32) 65 40 08 10		BY	DATE	SIGN	D.O:FIR VALV CR2 STR5	IND	DATE	MODIFICATION	BY	ENAKIEVO 61113	
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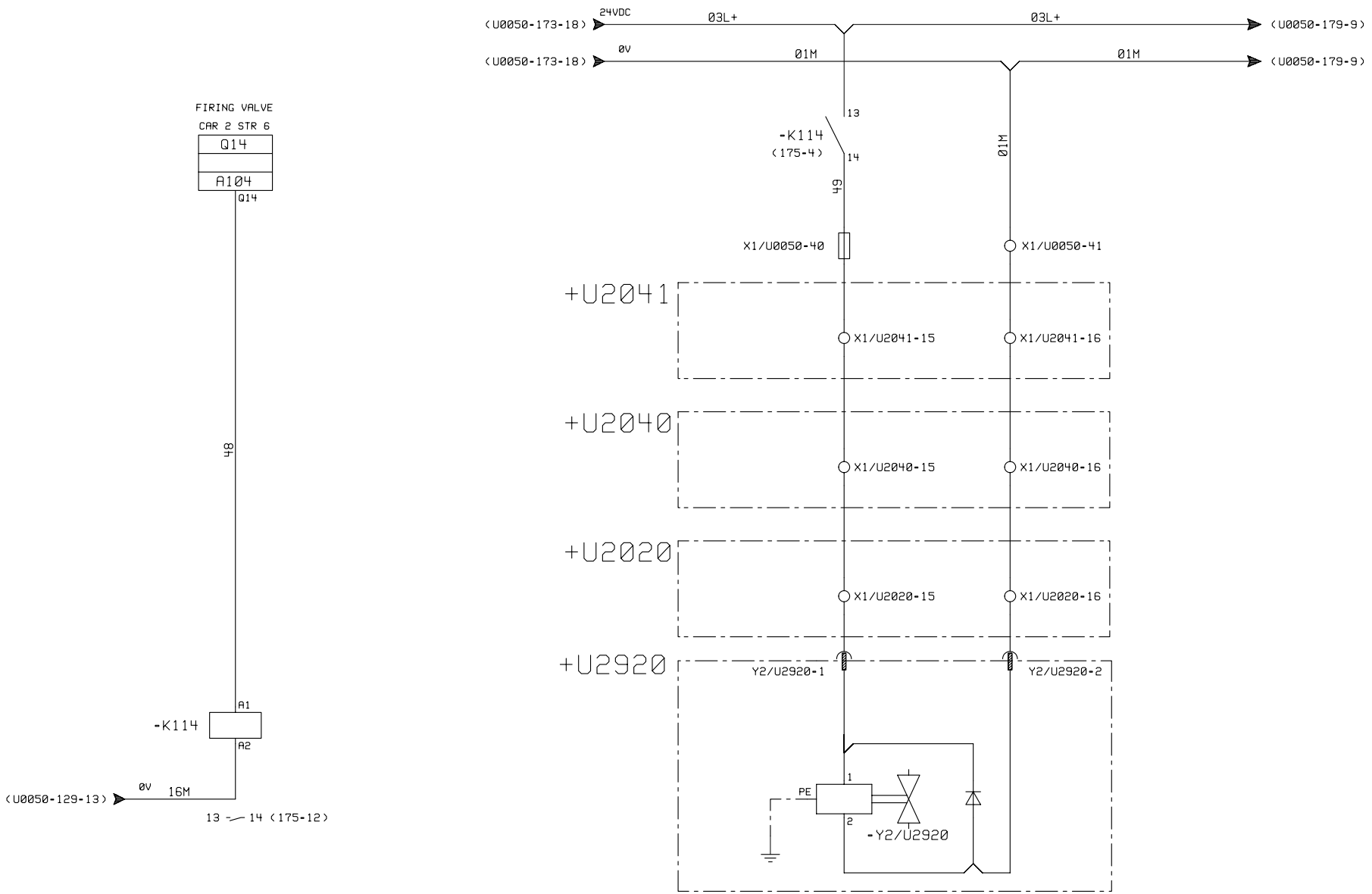

VESUVIUS SYSTEMS
Rue de Douvrain, 17
B-7011 GHLIN (BELGIQUE)
Tél.: (32) 65 40 08 10

	BY	DATE	SIGN
DRAWN	DVT	11-12-2006	
CHECKED	DBE	11-12-2006	
APPROVED	DBE	11-12-2006	

D.O:FIR VALV CR2 STR6

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IND	DATE	MODIFICATION	BY
0	11-12-2006		DVT

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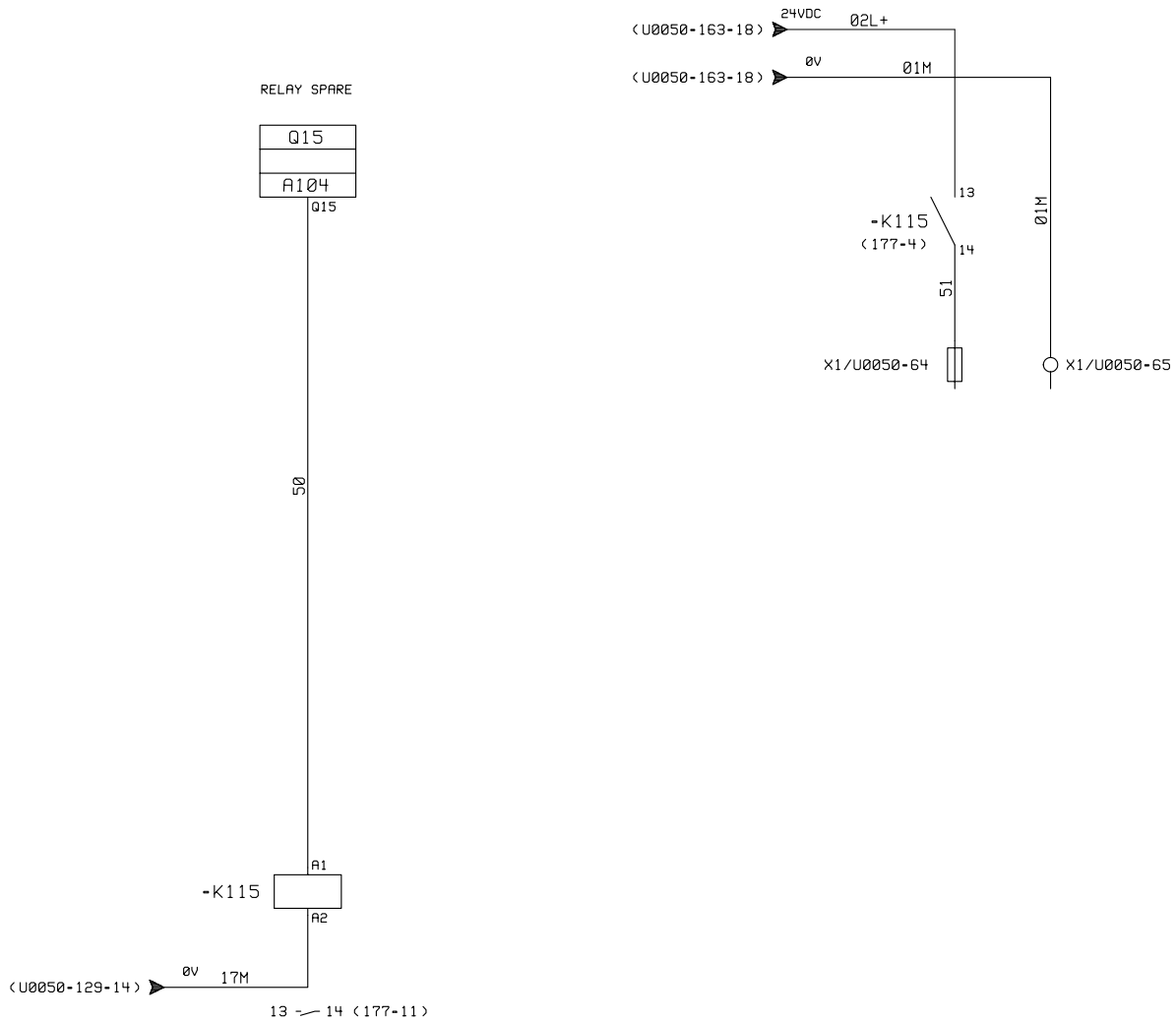

VESUVIUS SYSTEMS
Rue de Douvrain, 17
B-7011 GHLIN (BELGIQUE)
Tél.: (32) 65 40 08 10

	BY	DATE	SIGN
DRAWN	DVT	11-12-2006	
CHECKED	DBE	11-12-2006	
APPROVED	DBE	11-12-2006	

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+U0050

IND	DATE	MODIFICATION	BY
0	11-12-2006		DVT

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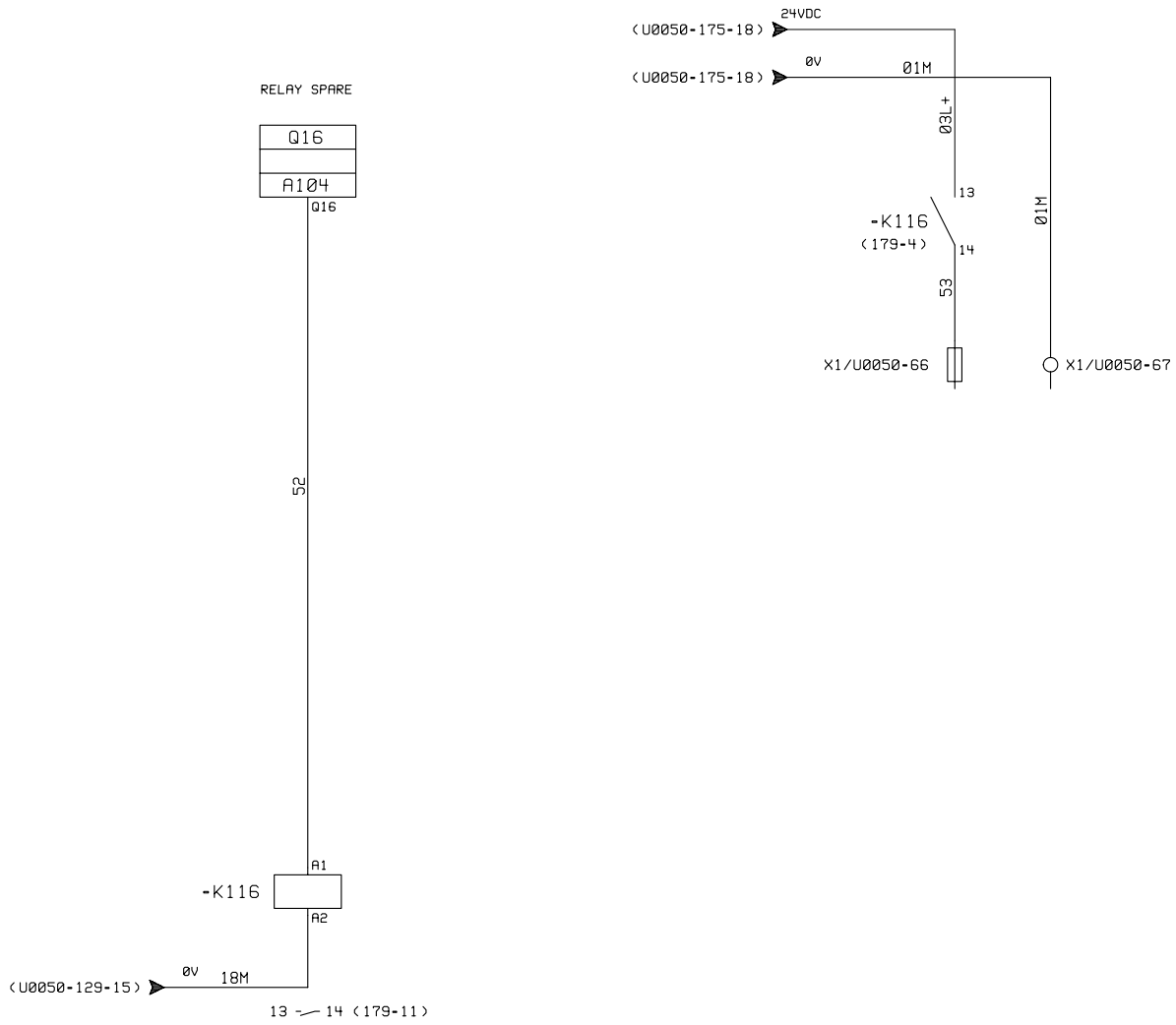
PAGE : 177



VESUVIUS SYSTEMS
Rue de Douvrain, 17
B-7011 GHLIN (BELGIQUE)
Tél.: (32) 65 40 08 10

	BY	DATE	SIGN
DRAWN	DVT	11-12-2006	
CHECKED	DBE	11-12-2006	
APPROVED	DBE	11-12-2006	

D.O: SPARE

+U0050

IND	DATE	MODIFICATION	BY
0	11-12-2006		DVT

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I/O LIST

POSITION	PAGE	CONNECTOR	ADDRESS	SIGNAL NAME
A101	131	I1	I1	PRESSURE OK CAR 1
A101	131	I2	I2	PRESSURE OK CAR 2
A101	133	I3	I3	NOZZLE CHANGE BUTTON STR 1
A101	133	I4	I4	NOZZLE CHANGE BUTTON STR 2
A101	133	I5	I5	NOZZLE CHANGE BUTTON STR 3
A101	135	I6	I6	NOZZLE CHANGE BUTTON STR 4
A101	135	I7	I7	NOZZLE CHANGE BUTTON STR 5
A101	135	I8	I8	NOZZLE CHANGE BUTTON STR 6
A102	137	I9	I9	E-CLOSE BUTTON
A102	139	I10	I10	TUNDISH CAR IN CASTING POSITION CAR 1
A102	139	I11	I11	TUNDISH CAR IN CASTING POSITION CAR 2
A102	139	I12	I12	SPARE
A103	141	I13	I13	SPARE
A103	141	I14	I14	SPARE
A103	141	I15	I15	SPARE
A103	141	I16	I16	SPARE
A104	143	I17	I17	SPARE
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A104	143	I20	I20	SPARE

VESUVIUS SYSTEMS
Rue de Douvrain, 17
B-7011 GHLIN (BELGIQUE)
Tél.: (32) 65 40 08 10

	BY	DATE	SIGN
DRAWN	DVT	11-12-2006	
CHECKED	DBE	11-12-2006	
APPROVED	DBE	11-12-2006	

I/O LIST

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IND	DATE	MODIFICATION	BY
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I/O LIST

POSITION	PAGE	CONNECTOR	ADDRESS	SIGNAL NAME
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A101	151	Q2	Q2	PRESSURE VALVE CAR 2
A101	153	Q3	Q3	FIRING VALVE CAR 1 STR 1
A101	155	Q4	Q4	FIRING VALVE CAR 1 STR 2
A102	157	Q5	Q5	FIRING VALVE CAR 1 STR 3
A102	159	Q6	Q6	FIRING VALVE CAR 1 STR 4
A102	161	Q7	Q7	FIRING VALVE CAR 1 STR 5
A102	163	Q8	Q8	FIRING VALVE CAR 1 STR 6
A103	165	Q9	Q9	FIRING VALVE CAR 2 STR 1
A103	167	Q10	Q10	FIRING VALVE CAR 2 STR 2
A103	169	Q11	Q11	FIRING VALVE CAR 2 STR 3
A103	171	Q12	Q12	FIRING VALVE CAR 2 STR 4
A104	173	Q13	Q13	FIRING VALVE CAR 2 STR 5
A104	175	Q14	Q14	FIRING VALVE CAR 2 STR 6
A104	177	Q15	Q15	RELAY SPARE
A104	179	Q16	Q16	RELAY SPARE

VESUVIUS SYSTEMS
Rue de Douvrain, 17
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Tél.: (32) 65 40 08 10

	BY	DATE	SIGN
DRAWN	DVT	11-12-2006	
CHECKED	DBE	11-12-2006	
APPROVED	DBE	11-12-2006	

I/O LIST

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IND	DATE	MODIFICATION	BY
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X1 / U0050

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	119	⏚	3	+U0060:3
-Q007:2	123	L10	4	
-Q007:4	123	L11	5	
	123	⏚	6	
-Q008:2	125	1	7	
-Q008:4	125	02M	8	
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-K103:14	153	27	14	X1/U1041:5
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X1/U0050:15	155	01M	17	X1/U1041:8
-K105:14	157	31	18	X1/U1041:9
X1/U0050:17	157	01M	19	X1/U1041:10
-K106:14	159	33	20	X1/U1041:11
X1/U0050:19	159	01M	21	X1/U1041:12
-K107:14	161	35	22	X1/U1041:13
X1/U0050:21	161	01M	23	X1/U1041:14
-K108:14	163	37	24	X1/U1041:15
X1/U0050:23	163	01M	25	X1/U1041:16
X1/U0050:10	131	04L+	26	X1/U2041:1
I2	131	3	27	X1/U2041:2
-K102:14	151	25	28	X1/U2041:3
-C101	151	01M	29	X1/U2041:4
-K109:14	165	39	30	X1/U2041:5
X1/U0050:29	165	01M	31	X1/U2041:6
-K110:14	167	41	32	X1/U2041:7
X1/U0050:31	167	01M	33	X1/U2041:8
-K111:14	169	43	34	X1/U2041:9
X1/U0050:33	169	01M	35	X1/U2041:10
-K112:14	171	45	36	X1/U2041:11
X1/U0050:35	171	01M	37	X1/U2041:12
-K113:14	173	47	38	X1/U2041:13
X1/U0050:37	173	01M	39	X1/U2041:14
-K114:14	175	49	40	X1/U2041:15

0060.1
NYY-J 2X2.5/2.5
1
2
J/V

1041.1
NYY 18X1.0
1
2
3
4
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7
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9
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14
15
16

2041.1
NYY 18X1.0
1
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15
2041.1

VESUVIUS SYSTEMS
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Tél.: (32) 65 40 08 10

	BY	DATE	SIGN
DRAWN	DVT	11-12-2006	
CHECKED	DBE	11-12-2006	
APPROVED	DBE	11-12-2006	

X1/U0050

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X1 / U0050

X1/U0050:39	175	01M	41	X1/U2041:16
X1/U0050:26	133	04L+	42	X1/U0115:1
I3	133	4	43	X1/U0115:2
X1/U0050:42	133	04L+	44	X1/U0215:1
I4	133	5	45	X1/U0215:2
X1/U0050:44	133	04L+	46	X1/U0315:1
I5	133	6	47	X1/U0315:2
X1/U0050:46	135	04L+	48	X1/U0415:1
I6	135	7	49	X1/U0415:2
X1/U0050:48	135	04L+	50	X1/U0515:1
I7	135	8	51	X1/U0515:2
X1/U0050:50	135	04L+	52	X1/U0615:1
I8	135	9	53	X1/U0615:2
X1/U0050:52	137	04L+	54	-S1/U0017:11
I9	137	10	55	-S1/U0017:12
X1/U0050:54	139	04L+	56	X1/U0035:1
I10	139	11	57	X1/U0035:2
I11	139	12	58	X1/U0035:3
I12	139	13	59	
I13	141	14	60	
I14	141	15	61	
I15	141	17	62	
I16	141	18	63	
-K115:14	177	51	64	
X1/U0050:25	177	01M	65	
-K116:14	179	53	66	
X1/U0050:41	179	01M	67	

2041.1

16		
1	0115.1	
2	NYY 2X1.0	
1	0215.1	
2	NYY 2X1.0	
1	0315.1	
2	NYY 2X1.0	
1	0415.1	
2	NYY 2X1.0	
1	0515.1	
2	NYY 2X1.0	
1	0615.1	
2	NYY 2X1.0	
1	0017.1	
2	NYY 2X1.0	
1	0035.1	
2	NYY 3X1.0	
3		

VESUVIUS SYSTEMS
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Tél.: (32) 65 40 08 10

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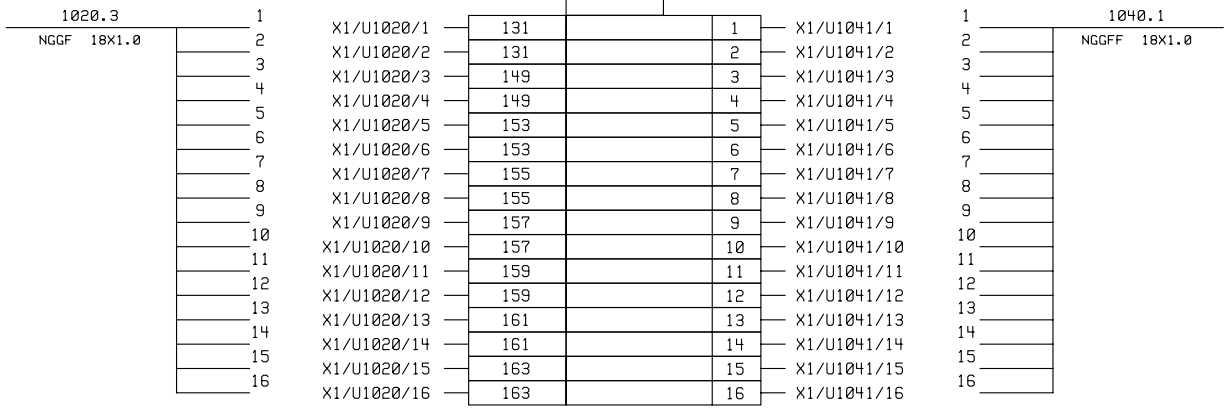
X1 / U1 040



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Tél.: (32) 65 40 08 10

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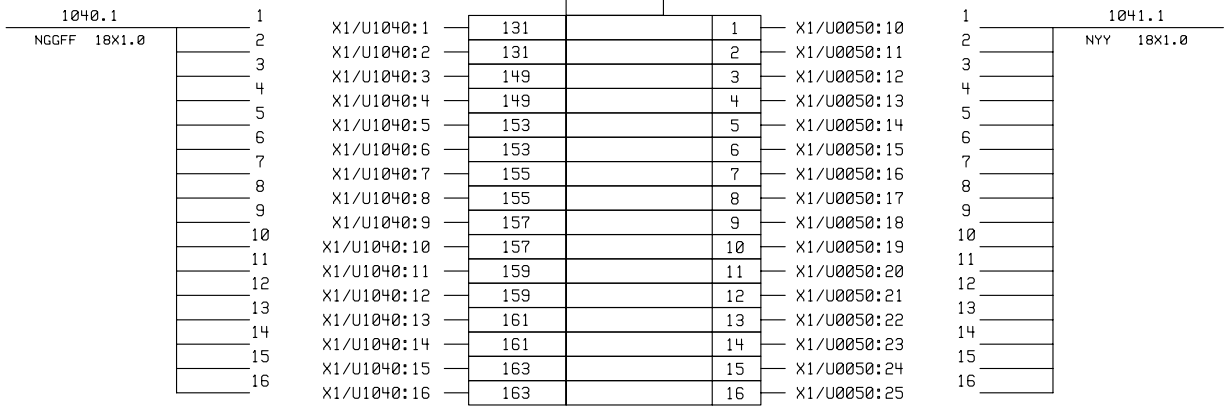
X1 / U1 041



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Rue de Douvrain, 17
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Tél.: (32) 65 40 08 10

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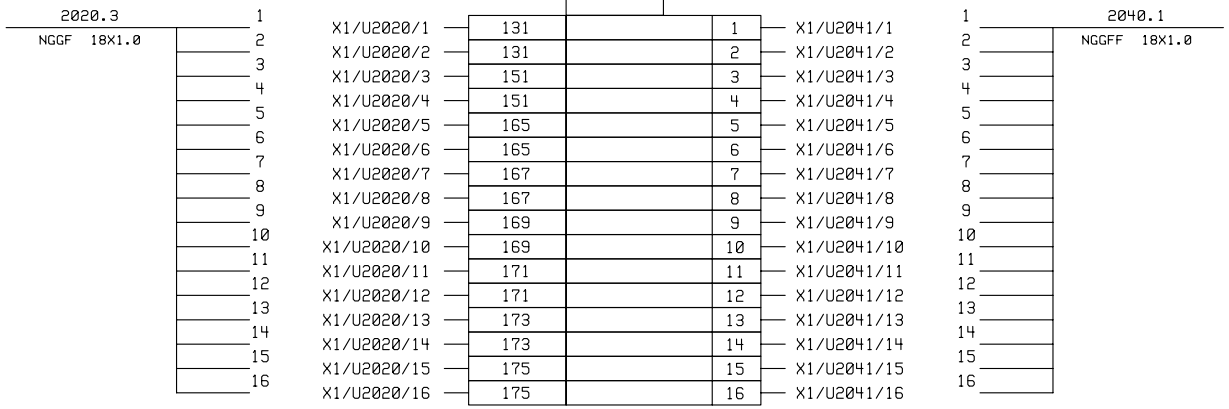
X1 / U2040



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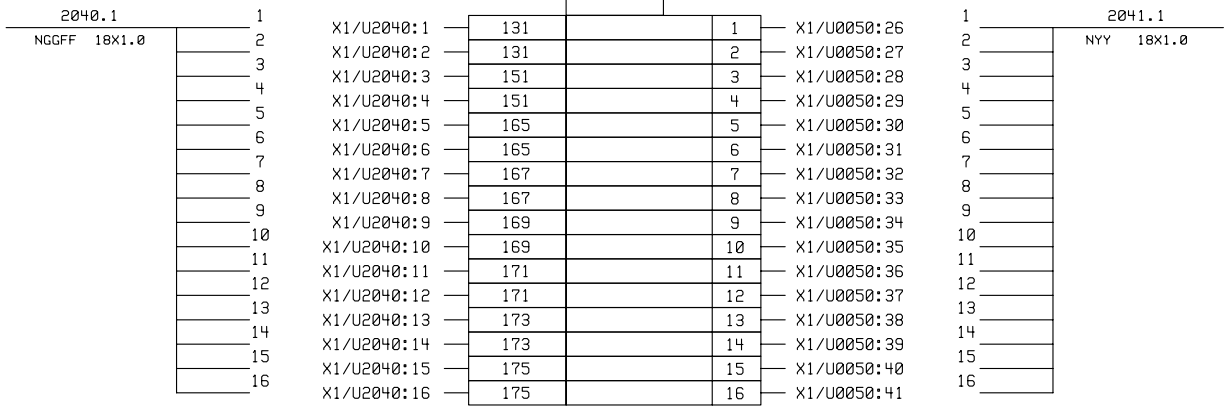

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Rue de Douvrain, 17
B-7011 GHLIN (BELGIQUE)
Tél.: (32) 65 40 08 10

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DRAWN	DVT	11-12-2006	
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PART LIST

CODE	PAGE	DESCRIPTION	MANUFACTURER	SUPPL. REF.	QTY	VES. NUMB.
-A101	127	LOGO 24VDC TRANSISTOR Vrs 4	SIEMENS	6ED1 052-1CC00-0BA4		9C58209
-A101	127	LOGO MEMORY CARD Vrs 4	SIEMENS	6ED1 056-5CA00-0BA0		9C69909
-A102	127	EXTENSION MODULE LOGO TRANS	SIEMENS	6ED1 055-1CB00-0BA0		9C24664
-A103	129	EXTENSION MODULE LOGO TRANS	SIEMENS	6ED1 055-1CB00-0BA0		9C24664
-A104	129	EXTENSION MODULE LOGO TRANS	SIEMENS	6ED1 055-1CB00-0BA0		9C24664
-C101	121	COPPER BAR	FREE	XXXX		
-E004	119	SERVICE PLUG	SIEMENS	5TE6 711		9B71419
-E005	119	SWITCH FOR LAMP	RITTAL	PS4315.300		
-E006	119	CONNECTION CABLE FOR LIGHT	RITTAL	PS4315.200		
-E006	119	SUPPORT FOR LIGHT	RITTAL	SZ2373.000		
-E006	119	LAMP FOR CABINET WITH FILAMENT TUBE	RITTAL	SZ4103.350		
-E101	119	CABINET 760X760X210	RITTAL	AE1077.600		
-E101	119	SUPPORT FOR PLANS (600mm)	RITTAL	PS4116.000		
-E102	119	LABEL	VESUVIUS	0005088		0005088
-E103	119	LABEL	VESUVIUS	1429000		1429000
-K101	149	SOCKET RELAY NO/NC 24V	PHOENIX	27 77 03 0		9C64843
-K101	149	INDUSTR.RELAY 1NO 24V	PHOENIX	28 23 625		9B63852
-K102	151	SOCKET RELAY NO/NC 24V	PHOENIX	27 77 03 0		9C64843
-K102	151	INDUSTR.RELAY 1NO 24V	PHOENIX	28 23 625		9B63852
-K103	153	SOCKET RELAY NO/NC 24V	PHOENIX	27 77 03 0		9C64843
-K103	153	INDUSTR.RELAY 1NO 24V	PHOENIX	28 23 625		9B63852
-K104	155	SOCKET RELAY NO/NC 24V	PHOENIX	27 77 03 0		9C64843
-K104	155	INDUSTR.RELAY 1NO 24V	PHOENIX	28 23 625		9B63852
-K105	157	SOCKET RELAY NO/NC 24V	PHOENIX	27 77 03 0		9C64843
-K105	157	INDUSTR.RELAY 1NO 24V	PHOENIX	28 23 625		9B63852
-K106	159	SOCKET RELAY NO/NC 24V	PHOENIX	27 77 03 0		9C64843
-K106	159	INDUSTR.RELAY 1NO 24V	PHOENIX	28 23 625		9B63852
-K107	161	SOCKET RELAY NO/NC 24V	PHOENIX	27 77 03 0		9C64843
-K107	161	INDUSTR.RELAY 1NO 24V	PHOENIX	28 23 625		9B63852
-K108	163	SOCKET RELAY NO/NC 24V	PHOENIX	27 77 03 0		9C64843
-K108	163	INDUSTR.RELAY 1NO 24V	PHOENIX	28 23 625		9B63852
-K109	165	SOCKET RELAY NO/NC 24V	PHOENIX	27 77 03 0		9C64843
-K109	165	INDUSTR.RELAY 1NO 24V	PHOENIX	28 23 625		9B63852
-K110	167	SOCKET RELAY NO/NC 24V	PHOENIX	27 77 03 0		9C64843

VESUVIUS SYSTEMS
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PART LIST

CODE	PAGE	DESCRIPTION	MANUFACTURER	SUPPL. REF.	QTY	VES. NUMB.
-K110	167	INDUSTR.RELAY 1NO 24V	PHOENIX	28 23 625		9B63852
-K111	169	SOCKET RELAY NO/NC 24V	PHOENIX	27 77 03 0		9C64843
-K111	169	INDUSTR.RELAY 1NO 24V	PHOENIX	28 23 625		9B63852
-K112	171	SOCKET RELAY NO/NC 24V	PHOENIX	27 77 03 0		9C64843
-K112	171	INDUSTR.RELAY 1NO 24V	PHOENIX	28 23 625		9B63852
-K113	173	SOCKET RELAY NO/NC 24V	PHOENIX	27 77 03 0		9C64843
-K113	173	INDUSTR.RELAY 1NO 24V	PHOENIX	28 23 625		9B63852
-K114	175	SOCKET RELAY NO/NC 24V	PHOENIX	27 77 03 0		9C64843
-K114	175	INDUSTR.RELAY 1NO 24V	PHOENIX	28 23 625		9B63852
-K115	177	SOCKET RELAY NO/NC 24V	PHOENIX	27 77 03 0		9C64843
-K115	177	INDUSTR.RELAY 1NO 24V	PHOENIX	28 23 625		9B63852
-K116	179	SOCKET RELAY NO/NC 24V	PHOENIX	27 77 03 0		9C64843
-K116	179	INDUSTR.RELAY 1NO 24V	PHOENIX	28 23 625		9B63852
-Q001	119	MAIN SWITCH 25A	SIEMENS	3LD2 130-0TK13		9C86620
-Q002	119	MOD.PROT.SW.2P 4A	SIEMENS	5SY6 204-7		9C53523
-Q003	121	MOD.PROT.SW.2P 4A D	SIEMENS	5SY6 204-8		
-Q004	121	MOD.PROT.SW.1P 16A	SIEMENS	5SY6 116-7		
-Q005	121	MOD.PROT.SW.1P 16A	SIEMENS	5SY6 116-7		
-Q006	121	MOD.PROT.SW.1P 3A	SIEMENS	5SY6 103-7		
-Q007	123	MOD.PROT.SW.2P 4A	SIEMENS	5SY6 204-7		9C53523
-Q008	125	MOD.PROT.SW.2P 4A	SIEMENS	5SY6 204-7		9C53523
-REP1	121	REPARTITOR OV 24VDC	LEGRAND	048 81		
-V001	121	POW.SUP.24V/20A (230VAC)	SIEMENS	6EP1336-2BA00		9C24631

VESUVIUS SYSTEMS
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APPROVED	DBE	11-12-2006	

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LIST FOR PURCHASE

CODE	PAGE	DESCRIPTION	MANUFACTURER	SUPPL. REF.	QTY	VES. NUMB.
-E102	119	LABEL	VESUVIUS	0005088	1	0005088
-REP1	121	REPARTITOR 0V 24VDC	LEGRAND	048 81	1	
-E103	119	LABEL	VESUVIUS	1429000	1	1429000
-K103	153	SOCKET RELAY NO/NC 24V	PHOENIX	27 77 03 0	16	9C64843
-K101	149	SOCKET RELAY NO/NC 24V	PHOENIX	27 77 03 0		
-K102	151	SOCKET RELAY NO/NC 24V	PHOENIX	27 77 03 0		
-K104	155	SOCKET RELAY NO/NC 24V	PHOENIX	27 77 03 0		
-K105	157	SOCKET RELAY NO/NC 24V	PHOENIX	27 77 03 0		
-K106	159	SOCKET RELAY NO/NC 24V	PHOENIX	27 77 03 0		
-K107	161	SOCKET RELAY NO/NC 24V	PHOENIX	27 77 03 0		
-K108	163	SOCKET RELAY NO/NC 24V	PHOENIX	27 77 03 0		
-K109	165	SOCKET RELAY NO/NC 24V	PHOENIX	27 77 03 0		
-K110	167	SOCKET RELAY NO/NC 24V	PHOENIX	27 77 03 0		
-K114	175	SOCKET RELAY NO/NC 24V	PHOENIX	27 77 03 0		
-K115	177	SOCKET RELAY NO/NC 24V	PHOENIX	27 77 03 0		
-K111	169	SOCKET RELAY NO/NC 24V	PHOENIX	27 77 03 0		
-K116	179	SOCKET RELAY NO/NC 24V	PHOENIX	27 77 03 0		
-K112	171	SOCKET RELAY NO/NC 24V	PHOENIX	27 77 03 0		
-K113	173	SOCKET RELAY NO/NC 24V	PHOENIX	27 77 03 0		
-K115	177	INDUSTR.RELAY 1NO 24V	PHOENIX	28 23 625	16	9B63852
-K102	151	INDUSTR.RELAY 1NO 24V	PHOENIX	28 23 625		
-K110	167	INDUSTR.RELAY 1NO 24V	PHOENIX	28 23 625		
-K114	175	INDUSTR.RELAY 1NO 24V	PHOENIX	28 23 625		
-K101	149	INDUSTR.RELAY 1NO 24V	PHOENIX	28 23 625		
-K116	179	INDUSTR.RELAY 1NO 24V	PHOENIX	28 23 625		
-K103	153	INDUSTR.RELAY 1NO 24V	PHOENIX	28 23 625		
-K106	159	INDUSTR.RELAY 1NO 24V	PHOENIX	28 23 625		
-K109	165	INDUSTR.RELAY 1NO 24V	PHOENIX	28 23 625		
-K108	163	INDUSTR.RELAY 1NO 24V	PHOENIX	28 23 625		
-K107	161	INDUSTR.RELAY 1NO 24V	PHOENIX	28 23 625		
-K113	173	INDUSTR.RELAY 1NO 24V	PHOENIX	28 23 625		
-K112	171	INDUSTR.RELAY 1NO 24V	PHOENIX	28 23 625		
-K105	157	INDUSTR.RELAY 1NO 24V	PHOENIX	28 23 625		
-K104	155	INDUSTR.RELAY 1NO 24V	PHOENIX	28 23 625		

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LIST FOR PURCHASE

CODE	PAGE	DESCRIPTION	MANUFACTURER	SUPPL. REF.	QTY	VES. NUMB.
-K111	169	INDUSTR.RELAY 1NO 24V	PHOENIX	28 23 625		
-Q001	119	MAIN SWITCH 25A	SIEMENS	3LD2 130-0TK13	1	9C86620
-Q006	121	MOD.PROT.SW.1P 3A	SIEMENS	5SY6 103-7	1	
-Q005	121	MOD.PROT.SW.1P 16A	SIEMENS	5SY6 116-7	2	
-Q004	121	MOD.PROT.SW.1P 16A	SIEMENS	5SY6 116-7		
-Q002	119	MOD.PROT.SW.2P 4A	SIEMENS	5SY6 204-7	3	9C53523
-Q008	125	MOD.PROT.SW.2P 4A	SIEMENS	5SY6 204-7		
-Q007	123	MOD.PROT.SW.2P 4A	SIEMENS	5SY6 204-7		
-Q003	121	MOD.PROT.SW.2P 4A D	SIEMENS	5SY6 204-8	1	
-E004	119	SERVICE PLUG	SIEMENS	5TE6 711	1	9B71419
-A101	127	LOGO 24VDC TRANSISTOR Vrs 4	SIEMENS	6ED1 052-1CC00-0BA4	1	9C58209
-A102	127	EXTENSION MODULE LOGO TRANS	SIEMENS	6ED1 055-1CB00-0BA0	3	9C24664
-A103	129	EXTENSION MODULE LOGO TRANS	SIEMENS	6ED1 055-1CB00-0BA0		
-A104	129	EXTENSION MODULE LOGO TRANS	SIEMENS	6ED1 055-1CB00-0BA0		
-A101	127	LOGO MEMORY CARD Vrs 4	SIEMENS	6ED1 056-5CA00-0BA0	1	9C69909
-V001	121	POW.SUP.24V/20A (230VAC)	SIEMENS	6EP1336-2BA00	1	9C24631
-E101	119	CABINET 760X760X210	RITTAL	AE1077.600	1	
-E101	119	SUPPORT FOR PLANS (600mm)	RITTAL	PS4116.000	1	
-E006	119	CONNECTION CABLE FOR LIGHT	RITTAL	PS4315.200	1	
-E005	119	SWITCH FOR LAMP	RITTAL	PS4315.300	1	
-E006	119	SUPPORT FOR LIGHT	RITTAL	SZ2373.000	1	
-E006	119	LAMP FOR CABINET WITH FILAMENT TUBE	RITTAL	SZ4103.350	1	
-C101	121	COPPER BAR	FREE	XXXX	1	

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LIST FOR PURCHASE

CODE	PAGE	DESCRIPTION	MANUFACTURER	SUPPL. REF.	QTY	VES. NUMB.
X1/U0050-1	119	SUPPORT'S LABEL FOR TERMINALS	PHOENIX	10 04 07 6	1	
X1/U0050-11	131	TERM. POINTS 0.08-2.5mm2	WAGO	280-633	42	
X1/U0050-10	131	TERM. POINTS 0.08-2.5mm2	WAGO	280-633		
X1/U0050-26	131	TERM. POINTS 0.08-2.5mm2	WAGO	280-633		
X1/U0050-27	131	TERM. POINTS 0.08-2.5mm2	WAGO	280-633		
X1/U0050-43	133	TERM. POINTS 0.08-2.5mm2	WAGO	280-633		
X1/U0050-42	133	TERM. POINTS 0.08-2.5mm2	WAGO	280-633		
X1/U0050-45	133	TERM. POINTS 0.08-2.5mm2	WAGO	280-633		
X1/U0050-44	133	TERM. POINTS 0.08-2.5mm2	WAGO	280-633		
X1/U0050-47	133	TERM. POINTS 0.08-2.5mm2	WAGO	280-633		
X1/U0050-46	133	TERM. POINTS 0.08-2.5mm2	WAGO	280-633		
X1/U0050-49	135	TERM. POINTS 0.08-2.5mm2	WAGO	280-633		
X1/U0050-48	135	TERM. POINTS 0.08-2.5mm2	WAGO	280-633		
X1/U0050-51	135	TERM. POINTS 0.08-2.5mm2	WAGO	280-633		
X1/U0050-50	135	TERM. POINTS 0.08-2.5mm2	WAGO	280-633		
X1/U0050-53	135	TERM. POINTS 0.08-2.5mm2	WAGO	280-633		
X1/U0050-52	135	TERM. POINTS 0.08-2.5mm2	WAGO	280-633		
X1/U0050-55	137	TERM. POINTS 0.08-2.5mm2	WAGO	280-633		
X1/U0050-54	137	TERM. POINTS 0.08-2.5mm2	WAGO	280-633		
X1/U0050-57	139	TERM. POINTS 0.08-2.5mm2	WAGO	280-633		
X1/U0050-56	139	TERM. POINTS 0.08-2.5mm2	WAGO	280-633		
X1/U0050-58	139	TERM. POINTS 0.08-2.5mm2	WAGO	280-633		
X1/U0050-59	139	TERM. POINTS 0.08-2.5mm2	WAGO	280-633		
X1/U0050-60	141	TERM. POINTS 0.08-2.5mm2	WAGO	280-633		
X1/U0050-61	141	TERM. POINTS 0.08-2.5mm2	WAGO	280-633		
X1/U0050-62	141	TERM. POINTS 0.08-2.5mm2	WAGO	280-633		
X1/U0050-63	141	TERM. POINTS 0.08-2.5mm2	WAGO	280-633		
X1/U0050-13	149	TERM. POINTS 0.08-2.5mm2	WAGO	280-633		
X1/U0050-29	151	TERM. POINTS 0.08-2.5mm2	WAGO	280-633		
X1/U0050-15	153	TERM. POINTS 0.08-2.5mm2	WAGO	280-633		
X1/U0050-17	155	TERM. POINTS 0.08-2.5mm2	WAGO	280-633		
X1/U0050-19	157	TERM. POINTS 0.08-2.5mm2	WAGO	280-633		
X1/U0050-21	159	TERM. POINTS 0.08-2.5mm2	WAGO	280-633		
X1/U0050-23	161	TERM. POINTS 0.08-2.5mm2	WAGO	280-633		

VESUVIUS SYSTEMS
Rue de Douvrain, 17
B-7011 GHLIN (BELGIQUE)
Tél.: (32) 65 40 08 10

	BY	DATE	SIGN
DRAWN	DVT	11-12-2006	
CHECKED	DBE	11-12-2006	
APPROVED	DBE	11-12-2006	

LIST FOR PURCHASE

X1/U0050

IND	DATE	MODIFICATION	BY
0	11-12-2006		DVT

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LIST FOR PURCHASE

CODE	PAGE	DESCRIPTION	MANUFACTURER	SUPPL. REF.	QTY	VES. NUMB.
X1/U0050-25	163	TERM. POINTS 0.08-2.5mm2	WAGO	280-633		
X1/U0050-31	165	TERM. POINTS 0.08-2.5mm2	WAGO	280-633		
X1/U0050-33	167	TERM. POINTS 0.08-2.5mm2	WAGO	280-633		
X1/U0050-35	169	TERM. POINTS 0.08-2.5mm2	WAGO	280-633		
X1/U0050-37	171	TERM. POINTS 0.08-2.5mm2	WAGO	280-633		
X1/U0050-39	173	TERM. POINTS 0.08-2.5mm2	WAGO	280-633		
X1/U0050-41	175	TERM. POINTS 0.08-2.5mm2	WAGO	280-633		
X1/U0050-65	177	TERM. POINTS 0.08-2.5mm2	WAGO	280-633		
X1/U0050-67	179	TERM. POINTS 0.08-2.5mm2	WAGO	280-633		
X1/U0050-12	149	TERM FUSE 4mm² +LED +FUSE 2AT	WAGO	281-512/281-501 + 281-916	16	
X1/U0050-28	151	TERM FUSE 4mm² +LED +FUSE 2AT	WAGO	281-512/281-501 + 281-916		
X1/U0050-14	153	TERM FUSE 4mm² +LED +FUSE 2AT	WAGO	281-512/281-501 + 281-916		
X1/U0050-16	155	TERM FUSE 4mm² +LED +FUSE 2AT	WAGO	281-512/281-501 + 281-916		
X1/U0050-18	157	TERM FUSE 4mm² +LED +FUSE 2AT	WAGO	281-512/281-501 + 281-916		
X1/U0050-20	159	TERM FUSE 4mm² +LED +FUSE 2AT	WAGO	281-512/281-501 + 281-916		
X1/U0050-22	161	TERM FUSE 4mm² +LED +FUSE 2AT	WAGO	281-512/281-501 + 281-916		
X1/U0050-24	163	TERM FUSE 4mm² +LED +FUSE 2AT	WAGO	281-512/281-501 + 281-916		
X1/U0050-30	165	TERM FUSE 4mm² +LED +FUSE 2AT	WAGO	281-512/281-501 + 281-916		
X1/U0050-32	167	TERM FUSE 4mm² +LED +FUSE 2AT	WAGO	281-512/281-501 + 281-916		
X1/U0050-34	169	TERM FUSE 4mm² +LED +FUSE 2AT	WAGO	281-512/281-501 + 281-916		
X1/U0050-36	171	TERM FUSE 4mm² +LED +FUSE 2AT	WAGO	281-512/281-501 + 281-916		
X1/U0050-38	173	TERM FUSE 4mm² +LED +FUSE 2AT	WAGO	281-512/281-501 + 281-916		
X1/U0050-40	175	TERM FUSE 4mm² +LED +FUSE 2AT	WAGO	281-512/281-501 + 281-916		
X1/U0050-64	177	TERM FUSE 4mm² +LED +FUSE 2AT	WAGO	281-512/281-501 + 281-916		
X1/U0050-66	179	TERM FUSE 4mm² +LED +FUSE 2AT	WAGO	281-512/281-501 + 281-916		
X1/U0050-1	119	FEMAL CONNECTOR FOR TERM	WAGO	769-103	3	
X1/U0050-4	123	FEMAL CONNECTOR FOR TERM	WAGO	769-103		
X1/U0050-7	125	FEMAL CONNECTOR FOR TERM	WAGO	769-103		
X1/U0050-1	119	CONNECT TERM POINT 0.08-2.5	WAGO	769-176	6	
X1/U0050-2	119	CONNECT TERM POINT 0.08-2.5	WAGO	769-176		
X1/U0050-4	123	CONNECT TERM POINT 0.08-2.5	WAGO	769-176		
X1/U0050-5	123	CONNECT TERM POINT 0.08-2.5	WAGO	769-176		
X1/U0050-7	125	CONNECT TERM POINT 0.08-2.5	WAGO	769-176		
X1/U0050-8	125	CONNECT TERM POINT 0.08-2.5	WAGO	769-176		

VESUVIUS SYSTEMS
Rue de Douvrain, 17
B-7011 GHLIN (BELGIQUE)
Tél.: (32) 65 40 08 10

	BY	DATE	SIGN
DRAWN	DVT	11-12-2006	
CHECKED	DBE	11-12-2006	
APPROVED	DBE	11-12-2006	

LIST FOR PURCHASE

X1/U0050

IND	DATE	MODIFICATION	BY
0	11-12-2006		DVT

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LIST FOR PURCHASE

CODE	PAGE	DESCRIPTION	MANUFACTURER	SUPPL. REF.	QTY	VES. NUMB.
X1/U0050-3	119	CONNECT TERM EARTH 0.08-2.5	WAGO	769-237	3	
X1/U0050-6	123	CONNECT TERM EARTH 0.08-2.5	WAGO	769-237		
X1/U0050-9	125	CONNECT TERM EARTH 0.08-2.5	WAGO	769-237		
X1/U0050-1	119	CONNECT TERM SEPARTAT 0.8-2.5	WAGO	769-307	3	
X1/U0050-4	123	CONNECT TERM SEPARTAT 0.8-2.5	WAGO	769-307		
X1/U0050-7	125	CONNECT TERM SEPARTAT 0.8-2.5	WAGO	769-307		
X1/U0050-1	119	STRIP EXTRACTING TERM 3P	WAGO	769-411	3	
X1/U0050-4	123	STRIP EXTRACTING TERM 3P	WAGO	769-411		
X1/U0050-7	125	STRIP EXTRACTING TERM 3P	WAGO	769-411		
X1/U0050-12	149	20% FUSE 2AT IN SPARE	FREE	FREE	1	

VESUVIUS SYSTEMS
Rue de Douvrain, 17
B-7011 GHLIN (BELGIQUE)
Tél.: (32) 65 40 08 10

	BY	DATE	SIGN
DRAWN	DVT	11-12-2006	
CHECKED	DBE	11-12-2006	
APPROVED	DBE	11-12-2006	

LIST FOR PURCHASE

X1/U0050

IND	DATE	MODIFICATION	BY
0	11-12-2006		DVT

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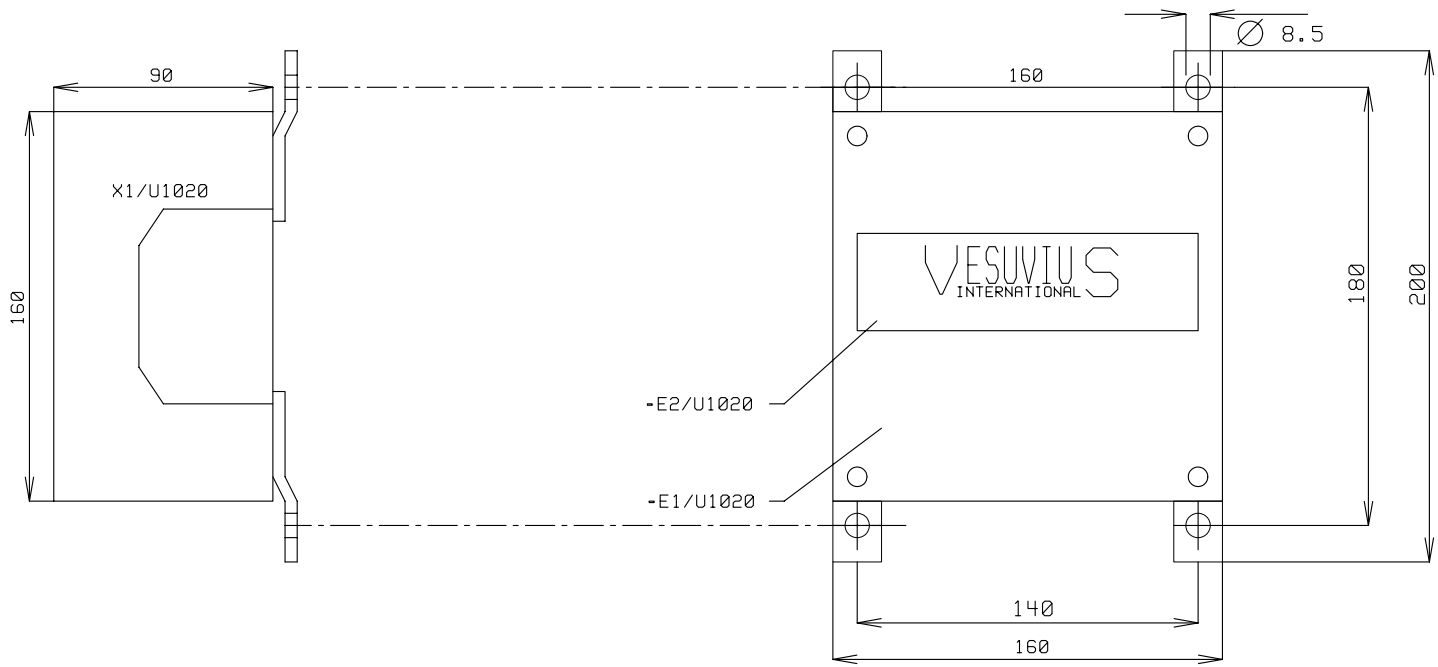

IP66

N.B. : ENGRAVE ON LABEL -E2 :
"HYDRAULIC JUNCTION BOX +U1020"
9D12132-POXXXXX-YY

FIX LABEL -E2
WITH INOX RIVETS.

PART LIST

ITEM	DESCRIPTION	MANUFACT.	REFERENCE	VES.NUMB.
-E2/U1020	LABEL	VESUVIUS	1429000	1429000
-E1/U1020	BOX (160X160X90)	ROSE	01.161609 A	
		RITTAL	9112.210 + 9121.160	
X1/U1020	SUPPORT FOR LABEL	PHOENIX	10 04 076	
X1/U1020	TEMINAL SEPARTAT	WAGO	280-314	
X1/U1020	16 TERMINALS STRIP	WAGO	280-633	

VESUVIUS SYSTEMS
Rue de Douvrain, 17
B-7011 GHLIN (BELGIQUE)
Tél.: (32) 65 40 08 10

	BY	DATE	SIGN
DRAWN	DVT	11-12-2006	
CHECKED	DBE	11-12-2006	
APPROVED	DBE	11-12-2006	

HYD JUNCTION BOX

+U1020

IND	DATE	MODIFICATION	BY
0	11-12-2006		DVT

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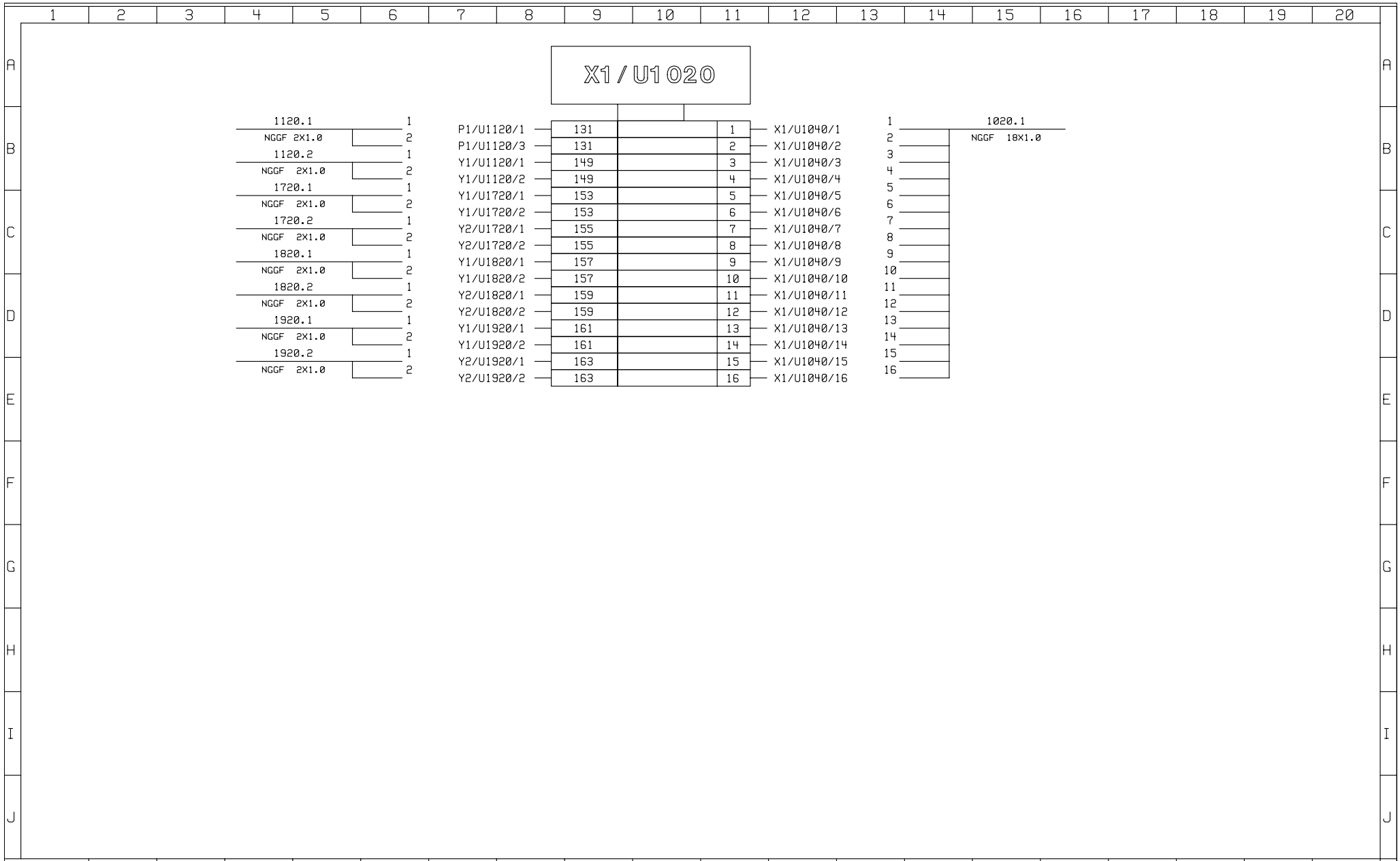
C.N.C

PAGE : 501



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A																					A
B																					B
C																					C
D																					D
E																					E
F																					F
G																					G
H																					H
I																					I
J																					J
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	

VESUVIUS SYSTEMS
Rue de Douvrain, 17
B-7011 GHLIN (BELGIQUE)
Tél.: (32) 65 40 08 10

	BY	DATE	SIGN
DRAWN	DVT	11-12-2006	
CHECKED	DBE	11-12-2006	
APPROVED	DBE	11-12-2006	

X1/U1020

IND	DATE	MODIFICATION	BY
0	11-12-2006		DVT

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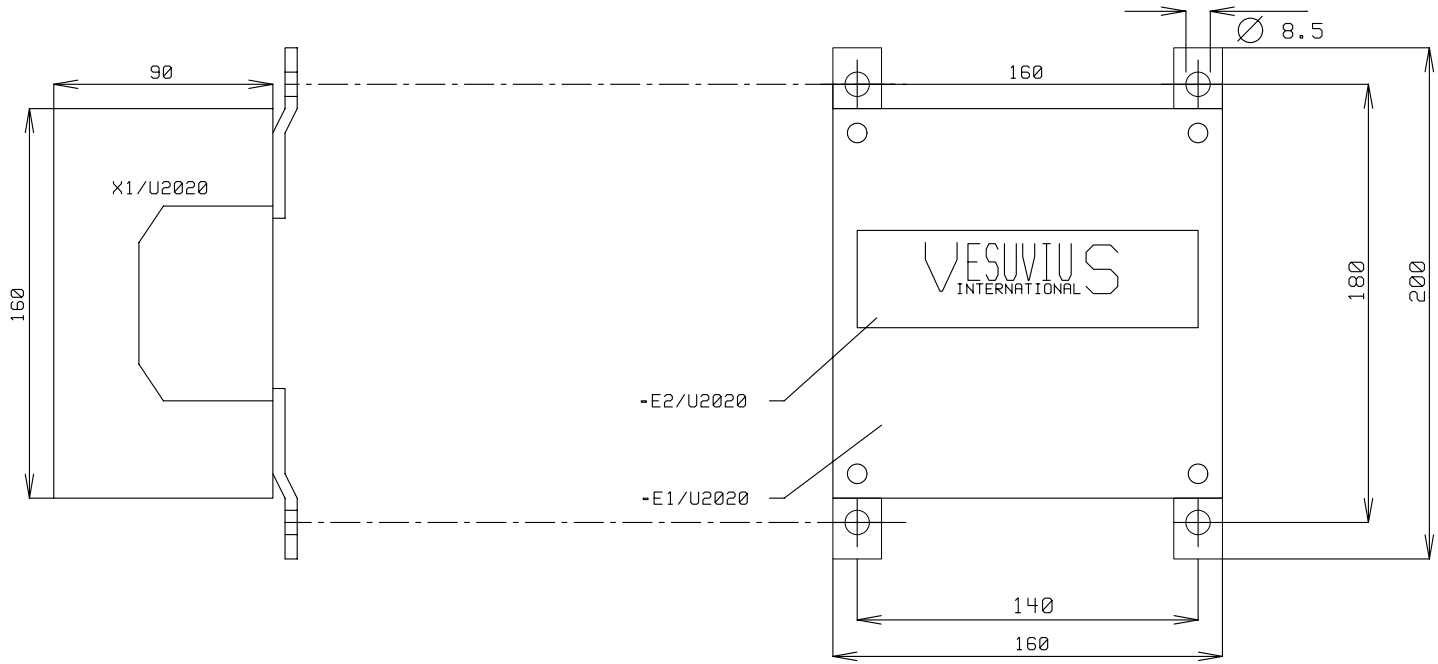

IP66

N.B. : ENGRAVE ON LABEL -E2 :
"HYDRAULIC JUNCTION BOX +U2020"
9D12140-POXXXXX-YY

FIX LABEL -E2
WITH INOX RIVETS.

PART LIST

ITEM	DESCRIPTION	MANUFACT.	REFERENCE	VES.NUMB.
-E2/U2020	LABEL	VESUVIUS	1429000	1429000
-E1/U2020	BOX (160X160X90)	ROSE	01.161609 A	
		RITTAL	9112.210 + 9121.160	
X1/U2020	SUPPORT FOR LABEL	PHOENIX	10 04 076	
X1/U2020	TEMINAL SEPARTAT	WAGO	280-314	
X1/U2020	16 TERMINALS STRIP	WAGO	280-633	

VESUVIUS SYSTEMS
Rue de Douvrain, 17
B-7011 GHLIN (BELGIQUE)
Tél.: (32) 65 40 08 10

	BY	DATE	SIGN
DRAWN	DVT	11-12-2006	
CHECKED	DBE	11-12-2006	
APPROVED	DBE	11-12-2006	

HYD JUNCTION BOX

+U2020

IND	DATE	MODIFICATION	BY
0	11-12-2006		DVT

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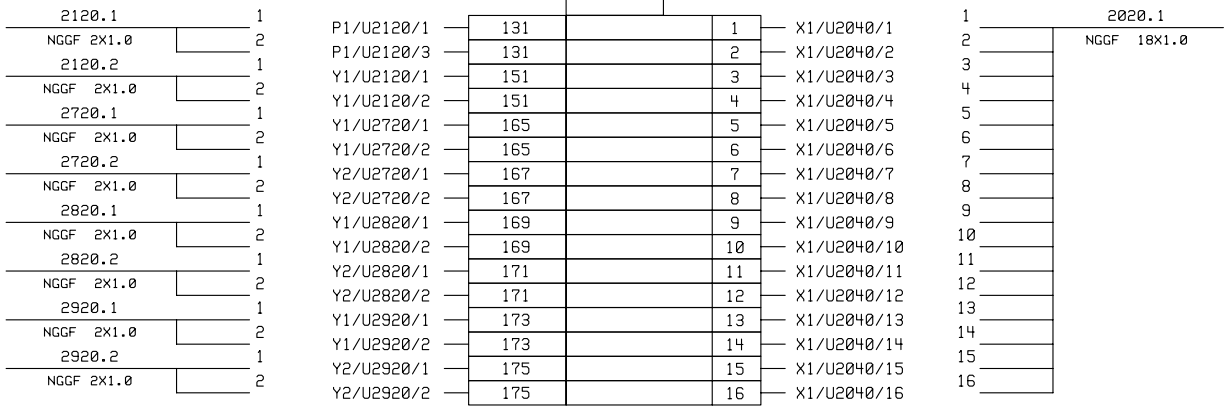
X1 / U2020



VESUVIUS SYSTEMS
Rue de Douvrain, 17
B-7011 GHLIN (BELGIQUE)
Tél.: (32) 65 40 08 10

	BY	DATE	SIGN
DRAWN	DVT	11-12-2006	
CHECKED	DBE	11-12-2006	
APPROVED	DBE	11-12-2006	

X1/U2020

IND	DATE	MODIFICATION	BY
0	11-12-2006		DVT

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VESUVIUS SYSTEMS

CALIBRATED NOZZLE CHANGER

CUSTOMER FILE

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HYDRAULIC EQUIPMENT	6
	7
	8
	9
TOOLS	10
INSTRUCTIONS	11
REFRACTORIES	12
PURCHASE	13
	14
AUTOMATION	15
	16 SOFTWARE MANUAL

FAX FROM : **VESUVIUS SYSTEMS-GHLIN**
B. DESCHAMPS
Tel +32-65-400 857 (direct)
Fax +32-65-311 474
GSM +32-478-75 91 97
GSM +86-136-14 94 53 01
E-mail benoit.deschamps@vesuvius.com

TO :

ATTENTION :

COPY :

FILE : last modified: 23/08/06

SUBJECT : Standard system functional description for CNC

Firing button

For each strand:

When the firing push button from the casting operator panel U0j15 (j = strand number) is pushed:

a) If no car is in casting position: pushing the button has no effect.

b) If car left is in casting position:

If the pressure on the accumulator block is ok (this means the pressure switch on U1020 has its contact closed) the pressure valve on U1020 is energized during 5 seconds and the firing valve for strand j on U1720 or U1820 or U1920 is energized during 2 seconds. There is a one second delay between the moment the pressure valve is energized and the moment the firing valve is energized, this is to ensure the pressure has built up in the circuit before firing.

The piston rod will go out in 0.2 seconds (setting on the speed control on the hydraulic block) and after 2 seconds goes in.
During this cycle, the calibrated nozzle is replaced by a new one or by a blank plate to stop the casting.

c) If car right is in casting position: replace U1xxx by U2xxx in the former paragraph.

Emergency close button

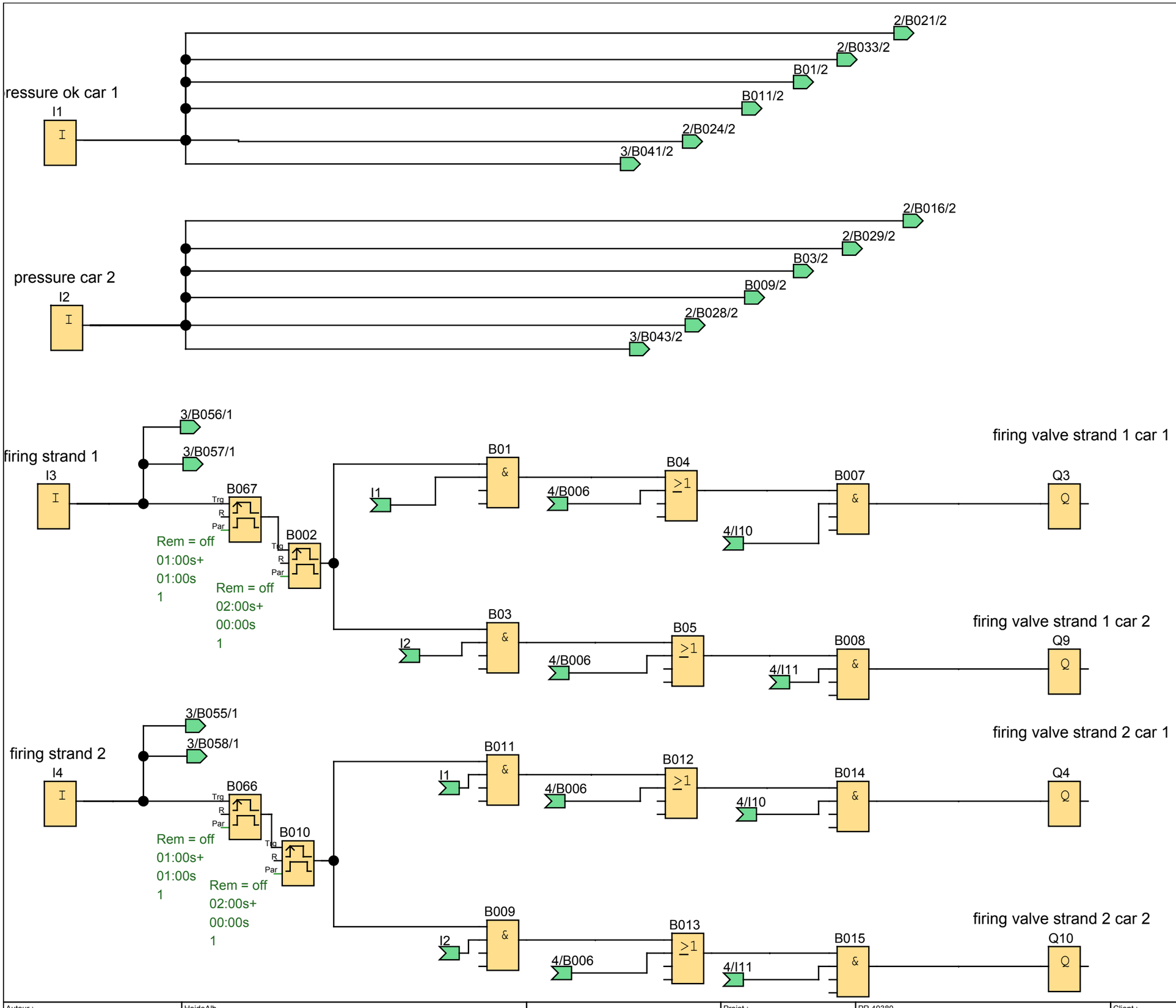
When the emergency close button on U0017 is pushed

a) If no car is in casting position: pushing the button has no effect.

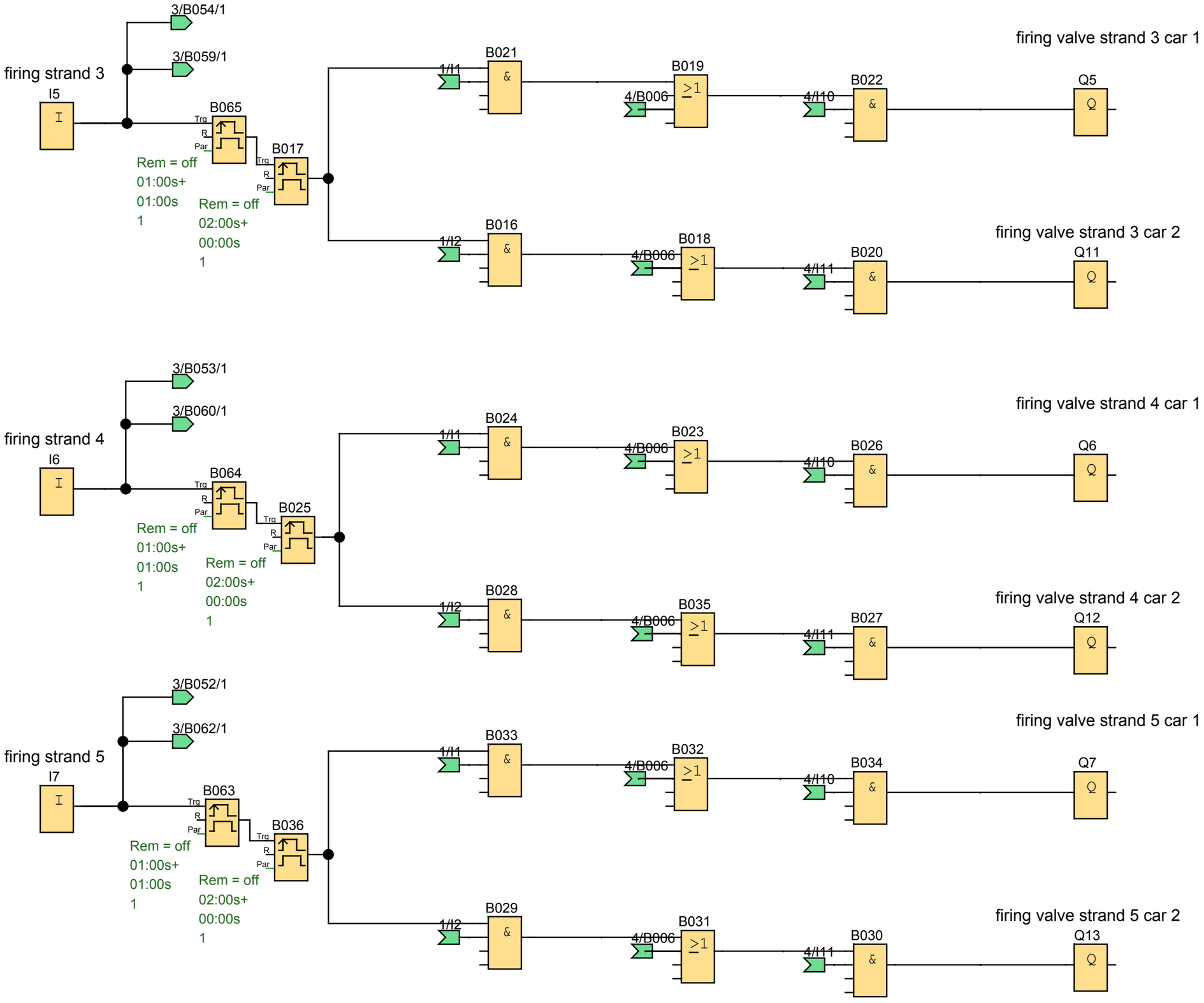
b) If car left is in casting position:

The pressure valve on U1020 is energized during 5 seconds and all firing valves on U1720 and U1820 and U1920 are energized during 2 seconds.

b) If car right is in casting position: replace U1xxx by U2xxx in the former paragraph.



Auteur :	HeideAlb		Projet :	PR 40380	Client :	
Vérifié :		C:\My Documents\VESUVIUS\Image2.gif	Installation :	Zawiercie	N° schéma :	
Date de création/modification :	22/06/04 10:08/23/08/06 08:04		Fichier :	CNC standard.lsc	Page :	1 / 4



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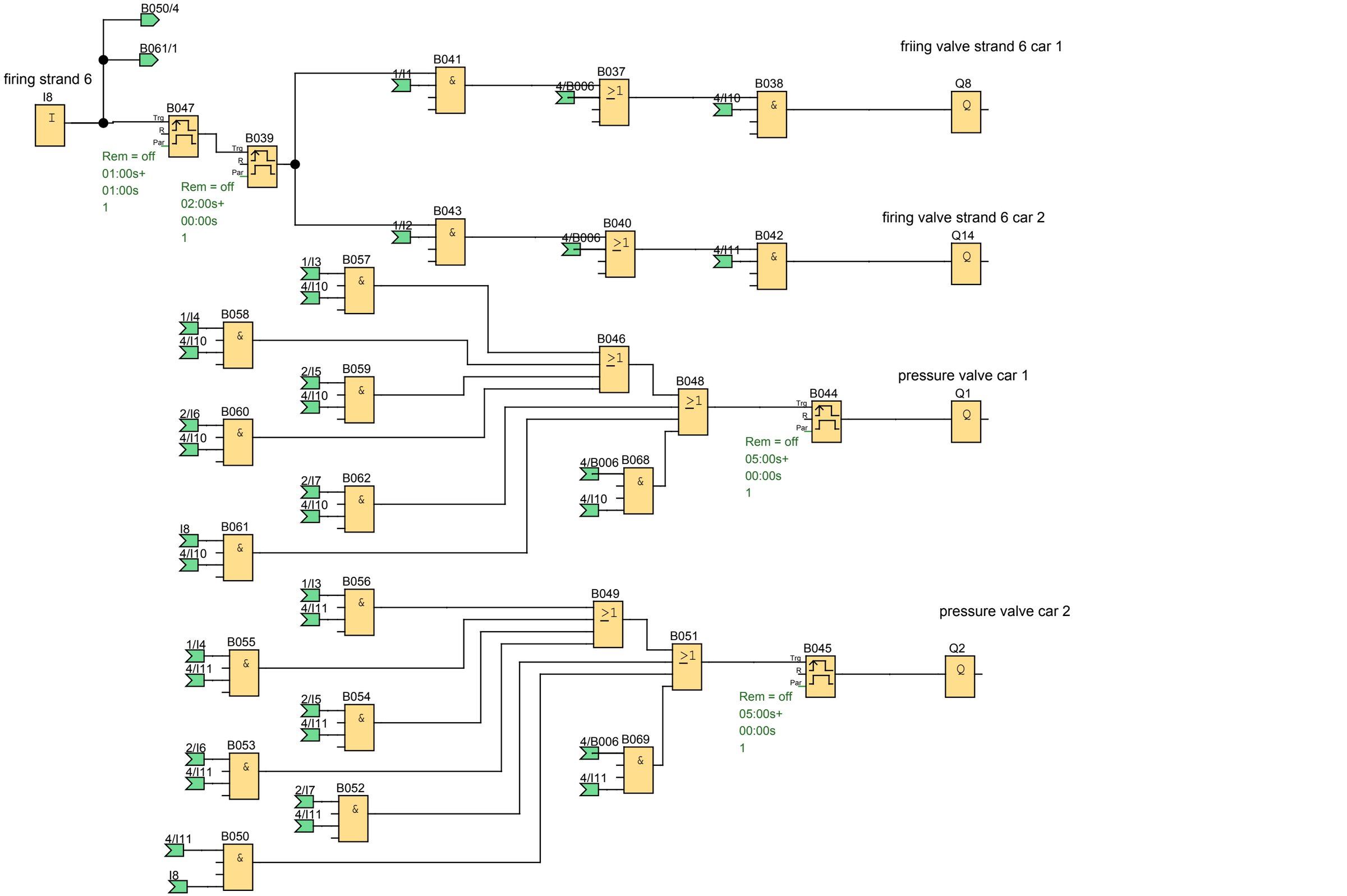
Date de création/modification :	22/06/04 10:08/23/08/06 08:04		Fichier :	CNC standard.lsc	Page :	2 / 4



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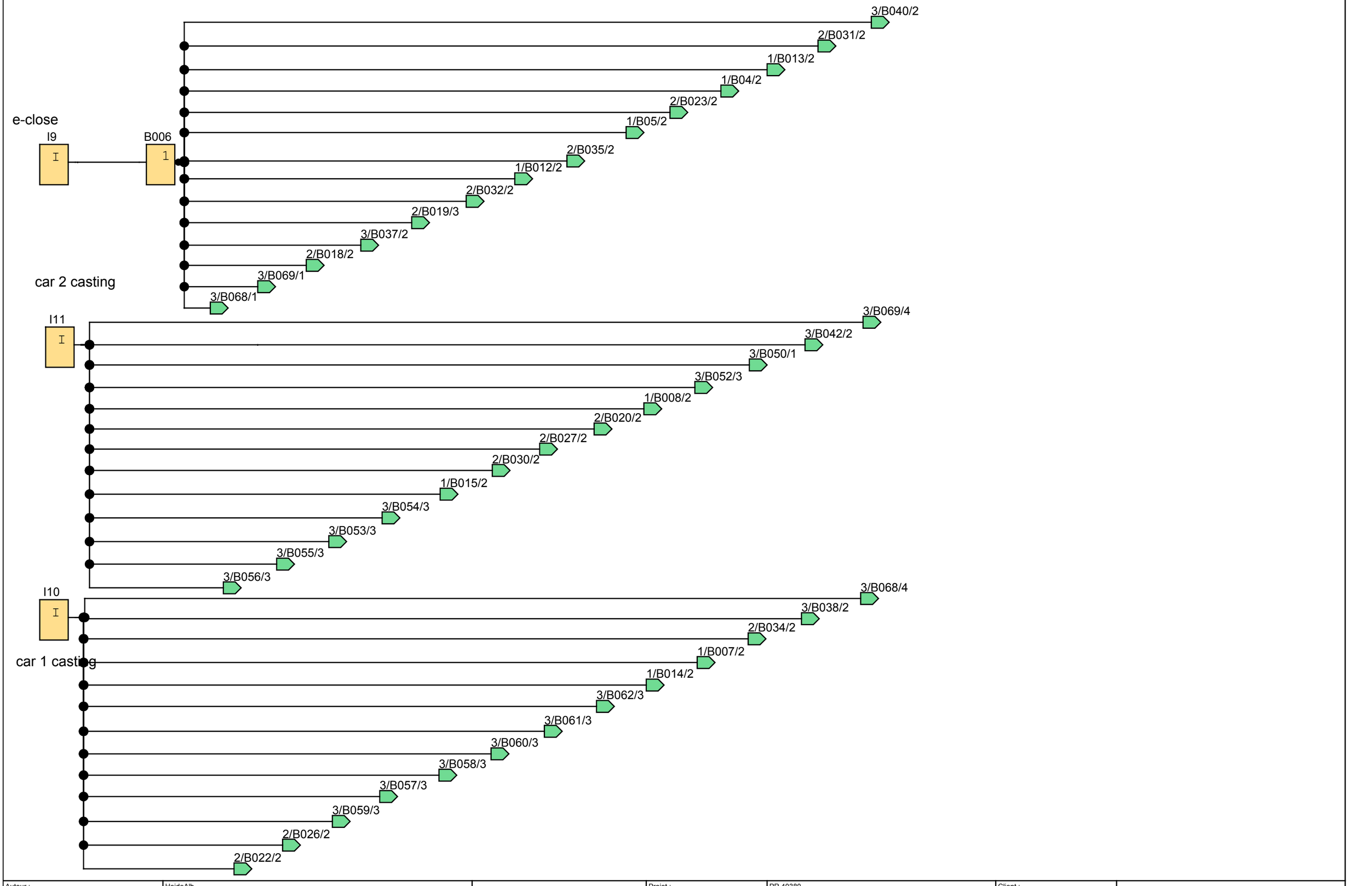
Date de création/modification :	22/06/04 10:08/23/08/06 08:04		Fichier :	CNC standard.lsc	Page :	3 / 4



Auteur :	HeideAlb		Projet :	PR 40380	Client :	
Vérifié :		C:\My Documents\VESUVIUS\Image2.gif	Installation :	Zawiercie	N° schéma :	
Date de création/modification :	22/06/04 10:08/23/08/06 08:04		Fichier :	CNC standard.lsc	Page :	4 / 4

Numéro de bloc(type)	Paramètres
B002(Relais de passage déclenché par front) :	Rem = off 02:00s+ 00:00s 1
B010(Relais de passage déclenché par front) :	Rem = off 02:00s+ 00:00s 1
B017(Relais de passage déclenché par front) :	Rem = off 02:00s+ 00:00s 1
B025(Relais de passage déclenché par front) :	Rem = off 02:00s+ 00:00s 1
B036(Relais de passage déclenché par front) :	Rem = off 02:00s+ 00:00s 1
B039(Relais de passage déclenché par front) :	Rem = off 02:00s+ 00:00s 1
B044(Relais de passage déclenché par front) :	Rem = off 05:00s+ 00:00s 1
B045(Relais de passage déclenché par front) :	Rem = off 05:00s+ 00:00s 1
B047(Relais de passage déclenché par front) :	Rem = off 01:00s+ 01:00s 1
B063(Relais de passage déclenché par front) :	Rem = off 01:00s+ 01:00s 1
B064(Relais de passage déclenché par front) :	Rem = off 01:00s+ 01:00s 1
B065(Relais de passage déclenché par front) :	Rem = off 01:00s+ 01:00s 1
B066(Relais de passage déclenché par front) :	Rem = off 01:00s+ 01:00s 1
B067(Relais de passage déclenché par front) :	Rem = off 01:00s+ 01:00s 1
I1(Entrée) : pressure ok car 1	
I2(Entrée) : pressure car 2	
I3(Entrée) : firing strand 1	
I4(Entrée) : firing strand 2	

Numéro de bloc(type)	Paramètres
I5(Entrée) : firing strand 3	
I6(Entrée) : firing strand 4	
I7(Entrée) : firing strand 5	
I8(Entrée) : firing strand 6	
I9(Entrée) : e-close	
I10(Entrée) : car 1 casting	
I11(Entrée) : car 2 casting	
Q1(Sortie) : pressure valve car 1	
Q2(Sortie) : pressure valve car 2	
Q3(Sortie) : firing valve strand 1 car 1	
Q4(Sortie) : firing valve strand 2 car 1	
Q5(Sortie) : firing valve strand 3 car 1	
Q6(Sortie) : firing valve strand 4 car 1	
Q7(Sortie) : firing valve strand 5 car 1	
Q8(Sortie) : friing valve strand 6 car 1	
Q9(Sortie) : firing valve strand 1 car 2	
Q10(Sortie) : firing valve strand 2 car 2	
Q11(Sortie) : firing valve strand 3 car 2	
Q12(Sortie) : firing valve strand 4 car 2	
Q13(Sortie) : firing valve strand 5 car 2	
Q14(Sortie) : firing valve strand 6 car 2	

Connexion	Repérage
I1	
I2	
I3	
I4	
I5	
I6	
I7	
I8	
I9	
I10	
I11	
I12	
I13	
I14	
I15	
I16	
I17	
I18	
I19	
I20	
I21	
I22	
I23	
I24	
C1▲	
C2▼	
C3◀	
C4▶	
S1	
S2	
S3	
S4	
S5	
S6	
S7	
S8	
AI1	
AI2	
AI3	
AI4	
AI5	
AI6	
AI7	
AI8	
Q1	
Q2	
Q3	
Q4	
Q5	
Q6	
Q7	
Q8	
Q9	

Connexion	Repérage
Q10	
Q11	
Q12	
Q13	
Q14	
Q15	
Q16	
AQ1	
AQ2	
X1	
X2	
X3	
X4	
X5	
X6	
X7	
X8	
X9	
X10	
X11	
X12	
X13	
X14	
X15	
X16	