Gas Manifold Installation

Mounting of Gas Manifold at FRONT and REAR of CMS DT Muon chamber

Definitions for
MB1, MB2, MB3, MB4,...,
for each
+Z and -Z Types
and for
Services at Left and at Right

In this update:
- Added further available types of chambers
- Rechecked several chambers after “dressing” was completed

Still to be added:
- Check of two missing chamber types “chimney”
- Tube Length to Patch Panel (Lpp)

030730; updates 040731, 050517
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B. Philipps,
H. Reithler

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Gas Manifold v.3

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030828

Assembly of Pressure Transducers on Gas Manifold v.3

On each gas manifold of the CMS DT chambers one 100 mbar and one 500 mbar pressure transducer as well as the preamplifier PCB are mounted.

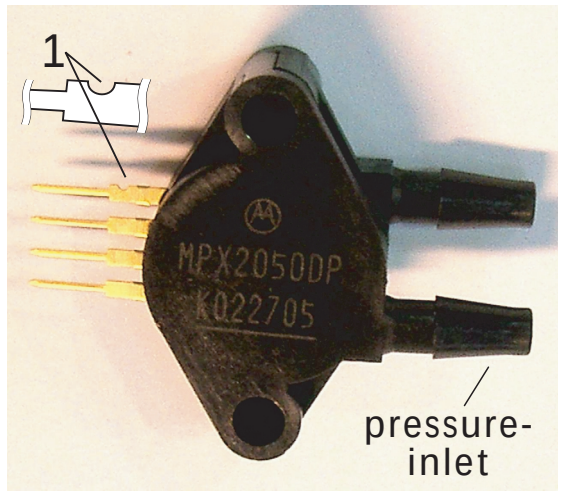

Fig. 1: Pin 1 of the sensor is marked by a small notch. The pressure inlet, to be glued to the manifold, is opposite to pin 4. The sensors are of type Motorola MPX2010DP (100 mbar) and MPX2050DP (500 mbar, shown here).

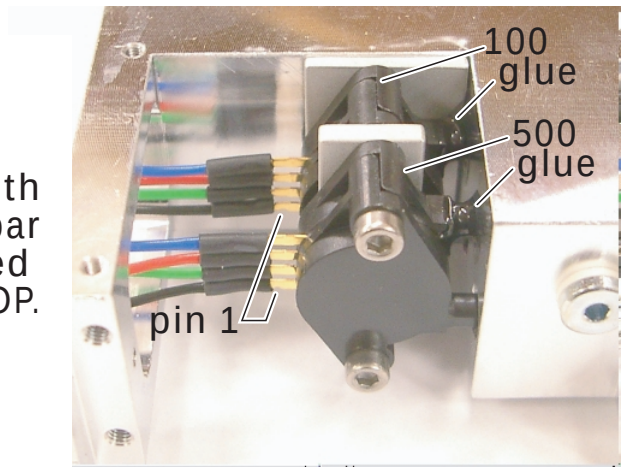

Fig. 2: In this view pin 1 of both sensors is at the BOTTOM, the 100 mbar sensor is the REAR one and the glued inlets are at the TOP.

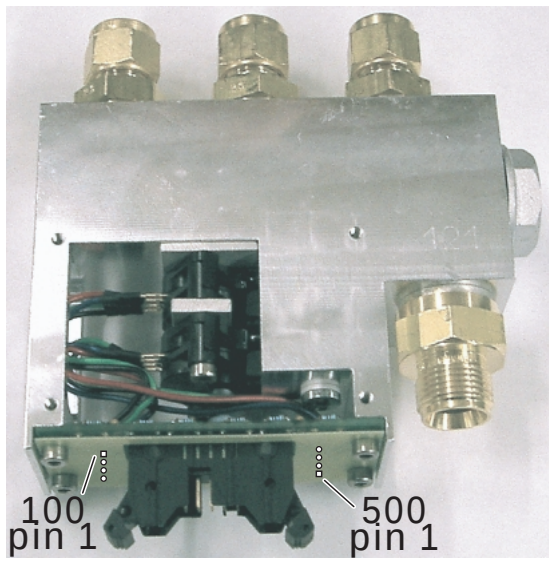

Fig. 3: Assembled manifold, with top cover removed.
Looking from outside, the cables connecting the sensors to the preamplifiers are located:
left, with pin 1 at top,
for the 100 mbar sensor,
and
right, with pin 1 at the bottom,
for the 500 mbar sensor.

Front: Definitions

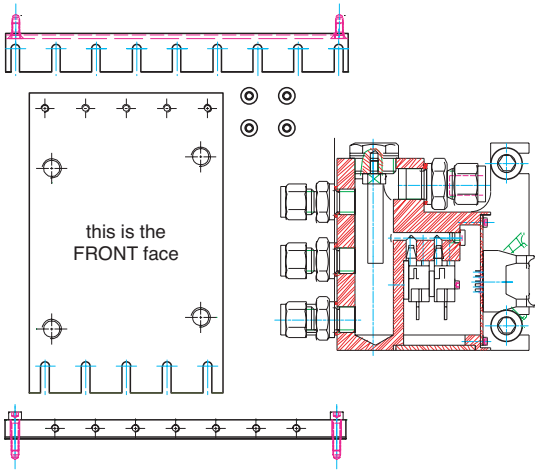

Fig.1: Front manifold and support pieces.
The plate size is 100mm x 155mm x 6 mm, while the L-profile (top) and the bar (bottom) are 178 mm long. The many holes, with a pitch of 21 mm, permit to adapt the support to every chamber type.

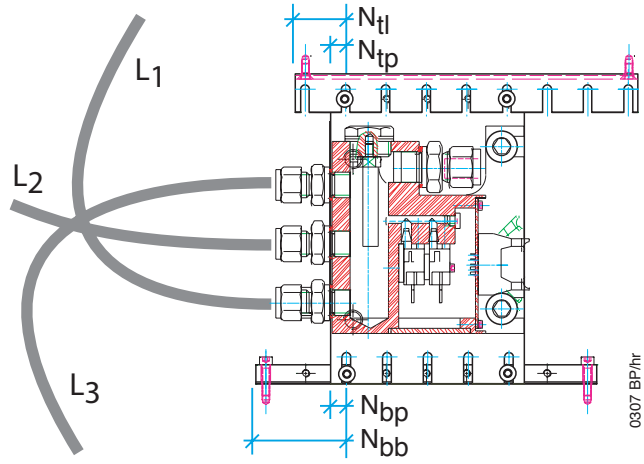

Fig.2: Front manifold support for a "left" chamber.
The variables indicated count the first hole used at the top L-profile (Ntl), the top of the plate (Ntp), the bottom of the plate (Nbp) and the bottom bar (Nbb). (These values are here Ntl = 2, Ntp = 1, Nbp = 1 and Nbb = 2.) Counting is always from the side with the 3 fittings.

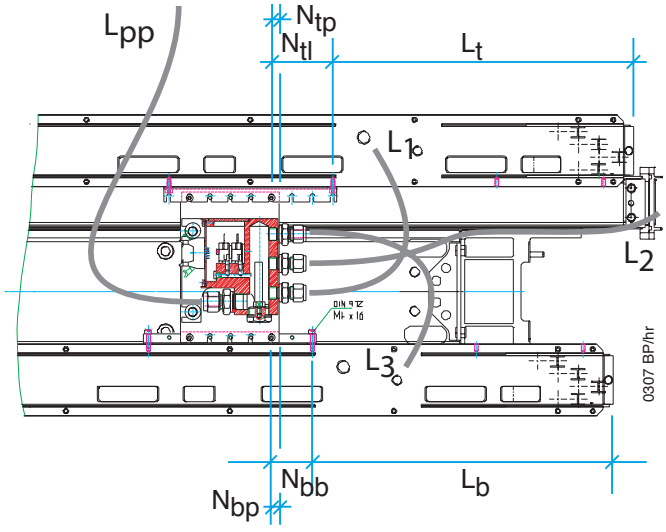

Fig.3: Front manifold support for a "right" chamber.
Counting is from the side with the 3 fittings, thus here from the right (the values are thus here Ntl = 4, Ntp = 1, Nbp = 1 and Nbb = 2). Similarly, the length (in mm) from the outer face of the next corner block of the SuperLayer to the first screw of the supporting profiles into the SL frame, Lt and Lb, are also indicated. The length L1, L2, L3, Lpp is the length to which the flexible tube is to be cut. The length serving to connect to the patch panel on the iron, Lpp, is still to be checked and will only be needed once the chamber is inserted into the CMS yoke.

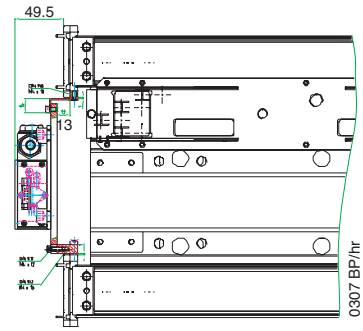

Fig.4: Front manifold support for a "left" chamber; lateral view.
Minicrate, cabling, carter, etc. are not shown.

Notes on MB4 chambers:

The FRONT manifolds of MB4 chambers do not need the support above but can be attached directly to the C-profile of the honeycomb panel, much like the REAR manifolds, but the front ones do not need a spacer plate.
For MB4 chambers the relevant geometry here is related to its position at the "left hemisphere" ("sx") or at the "right hemisphere" ("dx") rather than being on a "+Z" or on a "-Z" wheel. In the special case of MB4/4 and MB4/10 there are two chambers in the same slot ("twin" chambers) and thus an "s" and "d" are added to specify the left and right twin chamber, respectively (as usual, when seen from the interaction point).

Rear: Definitions

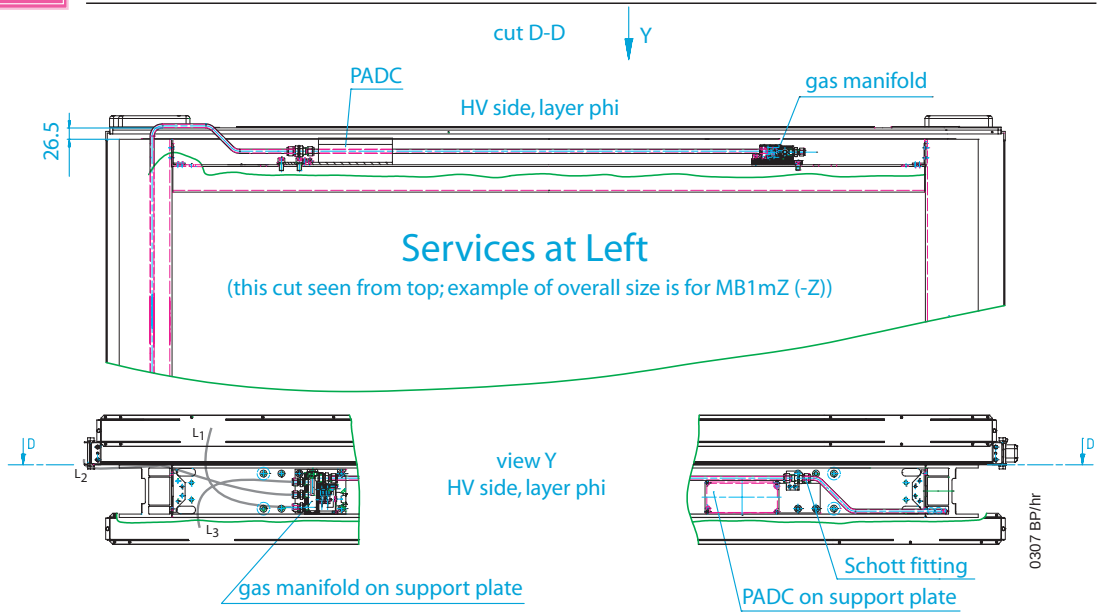

Fig.5: Rear manifold support for a "left" chamber.

Gas manifold and PADC-box are attached to the C-profile through spacer plates to ensure free access to the outer two threaded holes at left and right, for handling of the chamber. On all MB4 chambers (have no SLtheta and honeycomb panel is accordingly thicker) the fixation holes are ~27 mm higher but this also holds for the alignment passages. Therefore the same gas components also fit on MB4; keep the lateral gas pipe at the upper border of its passage.

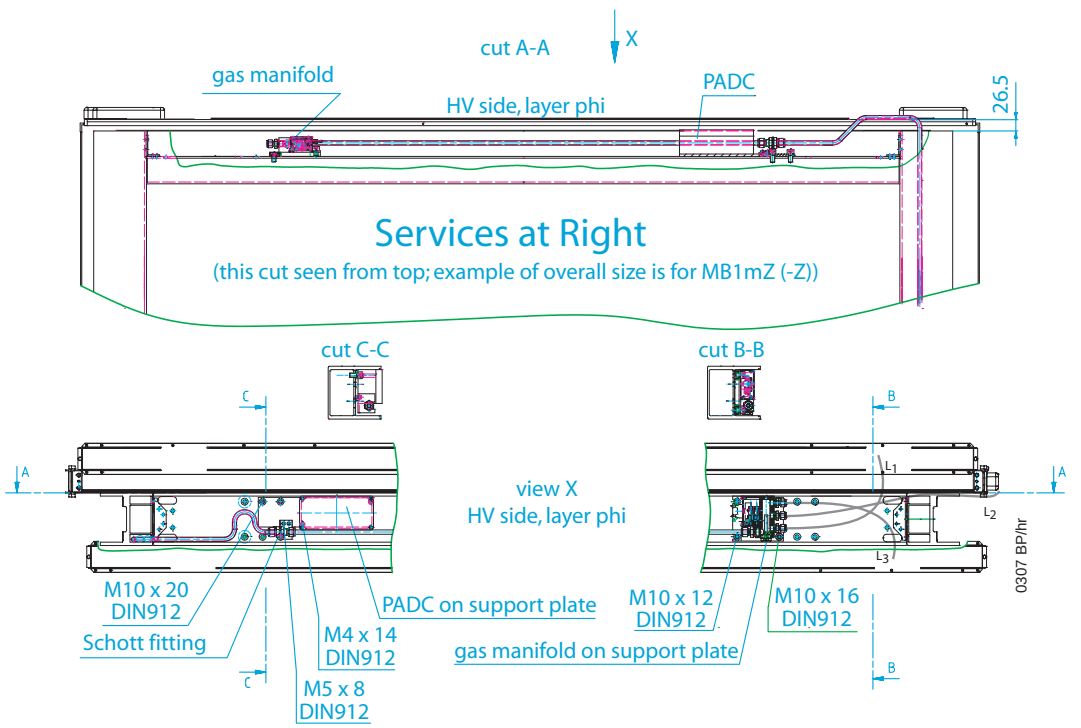

Fig.6: Rear manifold support for a "right" chamber.

Note that the gas pipe also passes through the lower lateral channel.

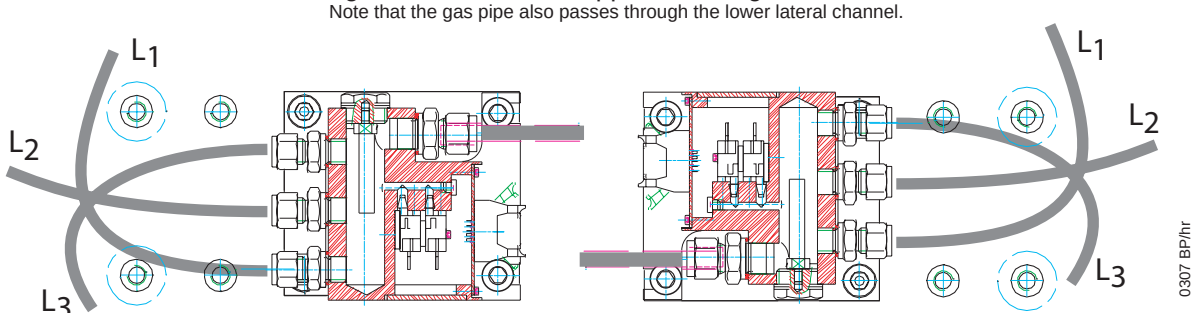

Fig.7: Rear manifold and naming of attached flexible tubes.

Gas maniflod at rear of a "left" and "right" chamber shown at left and right, respectively.

Gas Manifold: MB1

Mounting of Gas Manifold on CMS DT Muon chamber

(For definition of variables, see pages manifold_02 and _03.)

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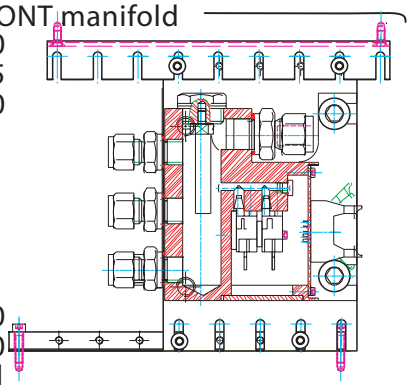
DT type = **MB1mL** (-Z, services at LEFT)

FRONT manifold

L_1 [mm] = 300
L_2 [mm] = 685
L_3 [mm] = 300

N_{tl} = 4
N_{tp} = 1
N_{bp} = 1
N_{bb} = 4

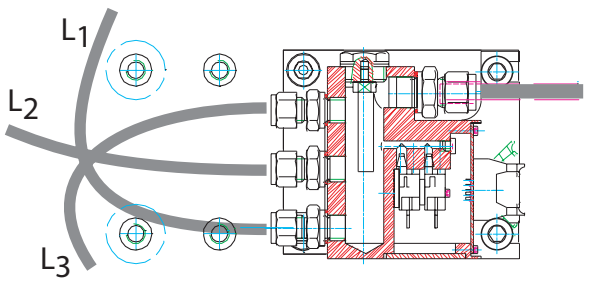
L_t [mm] = 310
L_b [mm] = 310
L_{pp} [mm] = tbd



REAR manifold

L_1 [mm] = 300
L_2 [mm] = 800
L_3 [mm] = 300

L2: pass under HV conn. of SLphi and above SLtheta; attach to cover frame of SL theta (~140 mm from corner block)



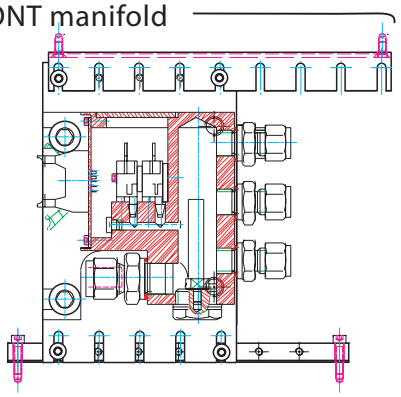
DT type = **MB1mR** (-Z, services at RIGHT)

FRONT manifold

L_1 [mm] = 300
L_2 [mm] = 650
L_3 [mm] = 300

N_{tl} = 5
N_{tp} = 1
N_{bp} = 1
N_{bb} = 3

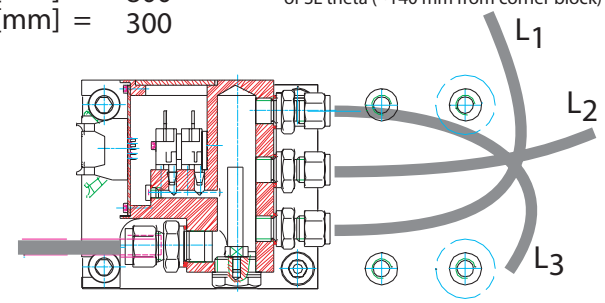
L_t [mm] = 310
L_b [mm] = 310
L_{pp} [mm] = tbd



REAR manifold

L_1 [mm] = 300
L_2 [mm] = 800
L_3 [mm] = 300

L2: pass under HV conn. of SLphi and above SLtheta; attach to cover frame of SL theta (~140 mm from corner block)



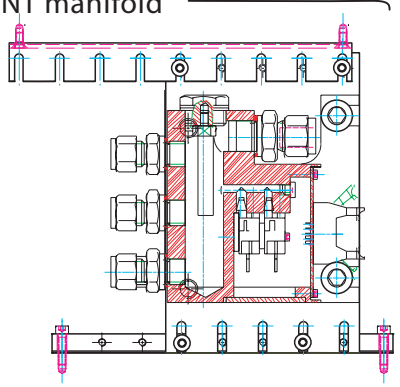
DT type = **MB1pL** (+Z, services at LEFT)

FRONT manifold

L_1 [mm] = 300
L_2 [mm] = 705
L_3 [mm] = 300

N_{tl} = 5
N_{tp} = 1
N_{bp} = 1
N_{bb} = 3

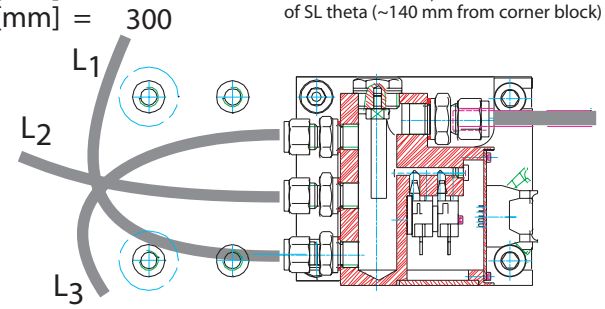
L_t [mm] = 310
L_b [mm] = 310
L_{pp} [mm] = tbd



REAR manifold

L_1 [mm] = 300
L_2 [mm] = 800
L_3 [mm] = 300

L2: pass under HV conn. of SLphi and above SLtheta; attach to cover frame of SL theta (~140 mm from corner block)



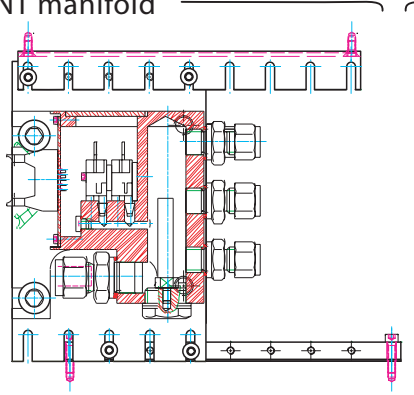
DT type = **MB1pR** (+Z, services at RIGHT)

FRONT manifold

L_1 [mm] = 300
L_2 [mm] = 655
L_3 [mm] = 300

N_{tl} = 5
N_{tp} = 1
N_{bp} = 1
N_{bb} = 5

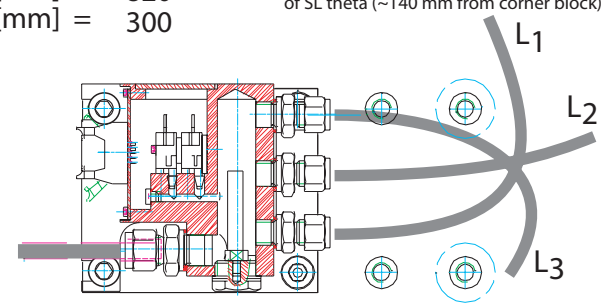
L_t [mm] = 310
L_b [mm] = 310
L_{pp} [mm] = tbd



REAR manifold

L_1 [mm] = 300
L_2 [mm] = 820
L_3 [mm] = 300

L2: pass under HV conn. of SLphi and above SLtheta; attach to cover frame of SL theta (~140 mm from corner block)



Gas Manifold: MB2

Mounting of Gas Manifold on CMS DT Muon chamber

(For definition of variables, see pages manifold_02 and _03.)

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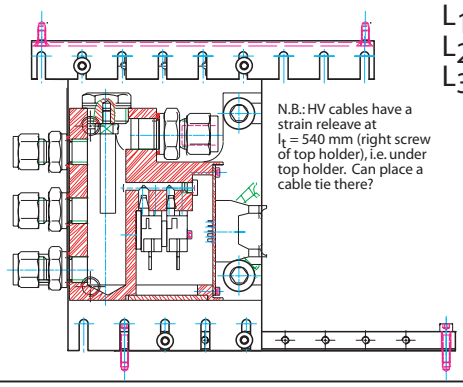
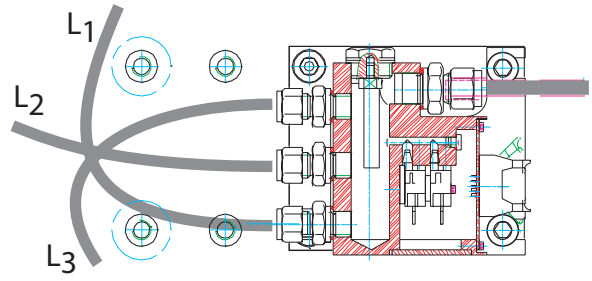
DT type = **MB2mL** (-Z, services at LEFT)

FRONT manifold		REAR manifold	
L_1 [mm] =	300	L_1 [mm] =	360
L_2 [mm] =	730	L_2 [mm] =	785
L_3 [mm] =	300	L_3 [mm] =	300
N_{tl} =	2		
N_{tp} =	1		
N_{bp} =	3		
N_{bb} =	1		
L_t [mm] =	360		
L_b [mm] =	360		
L_{pp} [mm] =	tbd		

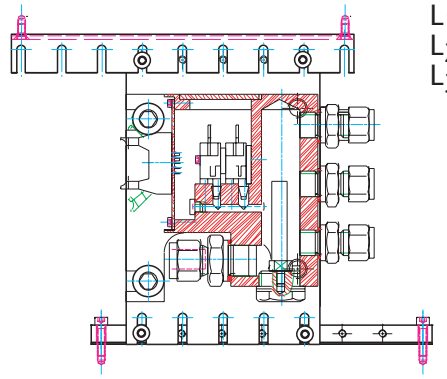


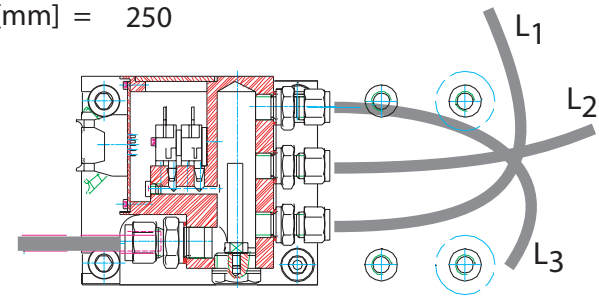
N.B.: HV cables have a strain releave at l_t = 540 mm (right screw of top holder), i.e. under top holder. Can place a cable tie there?



DT type = **MB2mR** (-Z, services at RIGHT)

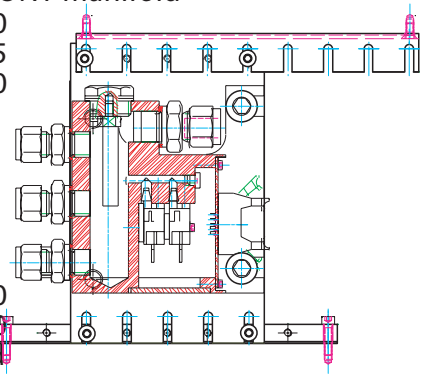
FRONT manifold		REAR manifold	
L_1 [mm] =	270	L_1 [mm] =	340
L_2 [mm] =	640	L_2 [mm] =	840
L_3 [mm] =	270	L_3 [mm] =	250
N_{tl} =	2		
N_{tp} =	1		
N_{bp} =	1		
N_{bb} =	3		
L_t [mm] =	360		
L_b [mm] =	360		
L_{pp} [mm] =	tbd		

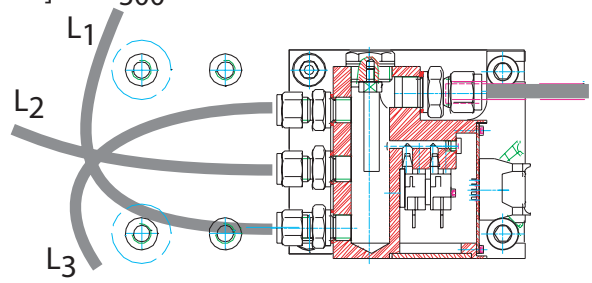




DT type = **MB2pL** (+Z, services at LEFT)

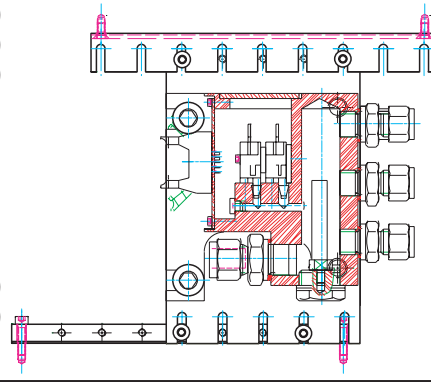
FRONT manifold		REAR manifold	
L_1 [mm] =	240	L_1 [mm] =	300
L_2 [mm] =	685	L_2 [mm] =	810
L_3 [mm] =	300	L_3 [mm] =	300
N_{tl} =	1		
N_{tp} =	1		
N_{bp} =	1		
N_{bb} =	2		
L_t [mm] =	360		
L_b [mm] =	360		
L_{pp} [mm] =	tbd		

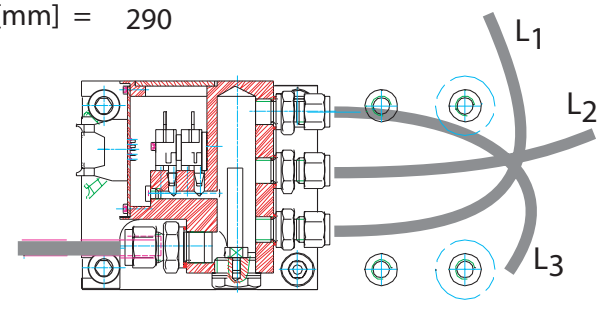




DT type = **MB2pR** (+Z, services at RIGHT)

FRONT manifold		REAR manifold	
L_1 [mm] =	300	L_1 [mm] =	340
L_2 [mm] =	680	L_2 [mm] =	810
L_3 [mm] =	240	L_3 [mm] =	290
N_{tl} =	3		
N_{tp} =	1		
N_{bp} =	2		
N_{bb} =	1		
L_t [mm] =	360		
L_b [mm] =	360		
L_{pp} [mm] =	tbd		





NOTE: The MB2 chambers have the threaded holes in the SL frames ~2 mm shallower than nominal. Need special screws, here

Gas Manifold: MB3

Mounting of Gas Manifold on CMS DT Muon chamber

(For definition of variables, see pages manifold_02 and _03.)

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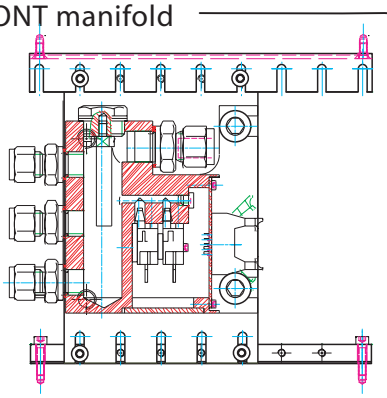
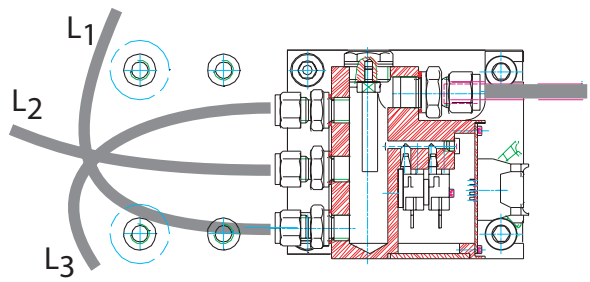
DT type = **MB3mL** (-Z, services at LEFT)

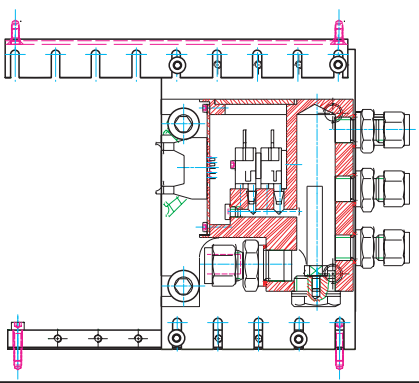
FRONT manifold		REAR manifold	
L_1 [mm] =	300	L_1 [mm] =	380
L_2 [mm] =	710	L_2 [mm] =	780
L_3 [mm] =	260	L_3 [mm] =	300
N_{tl} =	2		
N_{tp} =	1		
N_{bp} =	1		
N_{bb} =	1		
L_t [mm] =	360		
L_b [mm] =	360		
L_{pp} [mm] =	tbd		

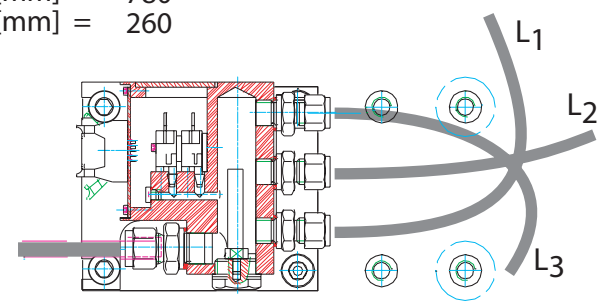




DT type = **MB3mR** (-Z, services at RIGHT)

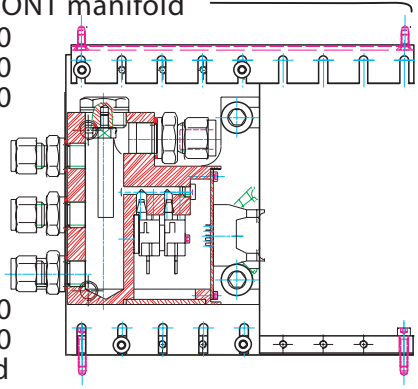
FRONT manifold		REAR manifold	
L_1 [mm] =	280	L_1 [mm] =	380
L_2 [mm] =	650	L_2 [mm] =	780
L_3 [mm] =	240	L_3 [mm] =	260
N_{tl} =	1		
N_{tp} =	1		
N_{bp} =	2		
N_{bb} =	1		
L_t [mm] =	360		
L_b [mm] =	360		
L_{pp} [mm] =	tbd		

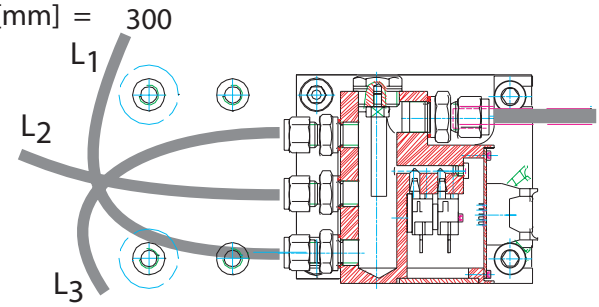




DT type = **MB3pL** (+Z, services at LEFT)

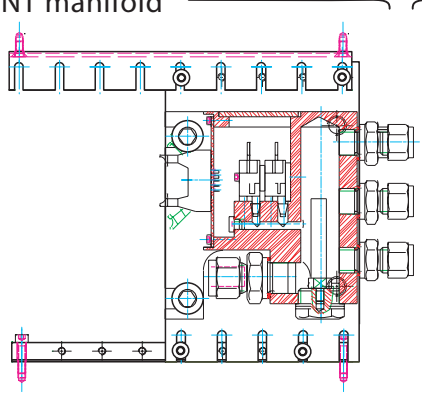
FRONT manifold		REAR manifold	
L_1 [mm] =	300	L_1 [mm] =	370
L_2 [mm] =	710	L_2 [mm] =	770
L_3 [mm] =	300	L_3 [mm] =	300
N_{tl} =	1		
N_{tp} =	1		
N_{bp} =	2		
N_{bb} =	1		
L_t [mm] =	360		
L_b [mm] =	360		
L_{pp} [mm] =	tbd		

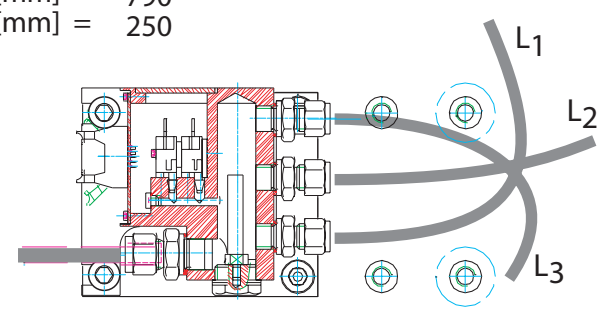




DT type = **MB3pR** (+Z, services at RIGHT)

FRONT manifold		REAR manifold	
L_1 [mm] =	265	L_1 [mm] =	370
L_2 [mm] =	620	L_2 [mm] =	790
L_3 [mm] =	240	L_3 [mm] =	250
N_{tl} =	1		
N_{tp} =	1		
N_{bp} =	2		
N_{bb} =	1		
L_t [mm] =	360		
L_b [mm] =	360		
L_{pp} [mm] =	tbd		





Gas Manifold: MB4

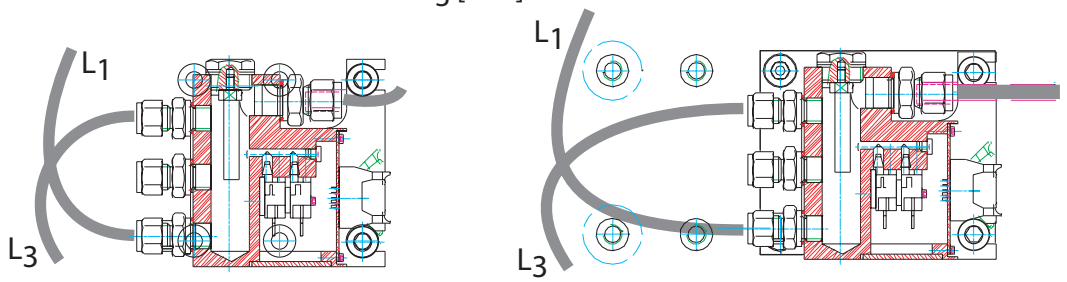
Mounting of Gas Manifold on CMS DT Muon chamber

030730, update 050517
G. Fetchenhauer,
B. Philipps,
H. Reithler

(For definition of variables, see pages manifold_02 and _03.)

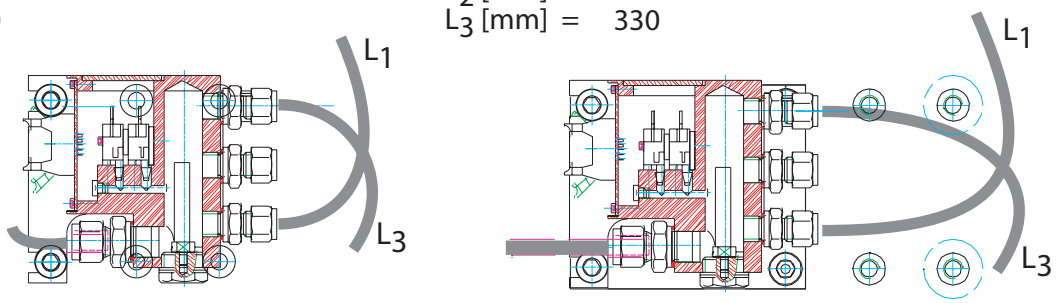
DT type = **MB4sxL** (left hemisphere, services at LEFT)

	FRONT manifold	REAR manifold
L_1 [mm] =	315	330
L_2 [mm] =	-	-
L_3 [mm] =	315	330
L_{pp} [mm] =	tbd	



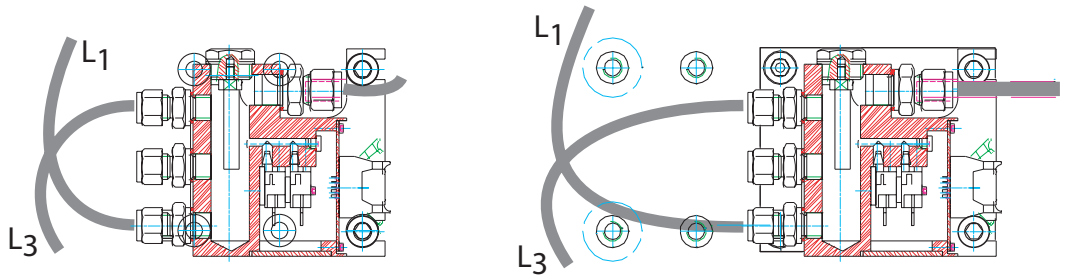
DT type = **MB4sxR** (left hemisphere, services at RIGHT)

	FRONT manifold	REAR manifold
L_1 [mm] =	330	330
L_2 [mm] =	-	-
L_3 [mm] =	340	330
L_{pp} [mm] =	tbd	



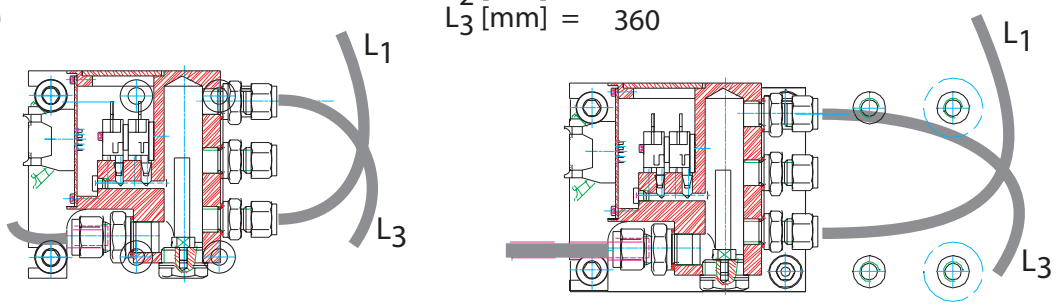
DT type = **MB4dxL** (right hemisphere, services at LEFT)

	FRONT manifold	REAR manifold
L_1 [mm] =	315	360
L_2 [mm] =	-	-
L_3 [mm] =	315	330
L_{pp} [mm] =	tbd	



DT type = **MB4dxR** (right hemisphere, services at RIGHT)

	FRONT manifold	REAR manifold
L_1 [mm] =	340	330
L_2 [mm] =	-	-
L_3 [mm] =	330	360
L_{pp} [mm] =	tbd	



Note: MB4 applies to MB4/1,2,3,5,6,7
Note: for MB4, left hemisphere ("sx"), right hemisphere ("dx") are relevant, not "+Z", "-Z"

Gas Manifold: MB4/4

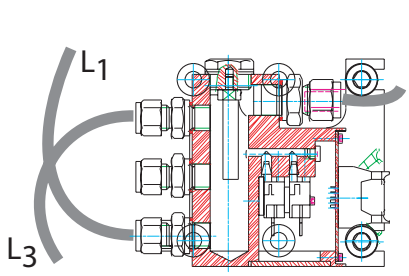
Mounting of Gas Manifold on CMS DT Muon chamber

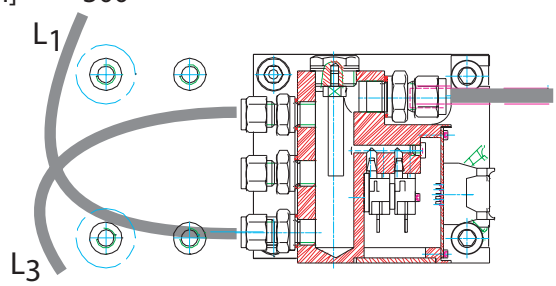
030730, update 040731
G. Fetchenhauer,
B. Philipps,
H. Reithler

(For definition of variables, see pages manifold_02 and _03.)

DT type = **MB4/4L** (services at LEFT)

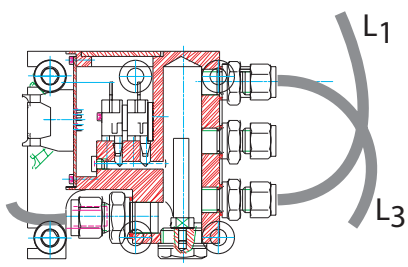
FRONT manifold		REAR manifold	
L_1 [mm] =	300	L_1 [mm] =	300
L_2 [mm] =	-	L_2 [mm] =	-
L_3 [mm] =	300	L_3 [mm] =	300
L_{pp} [mm] =	tbd		

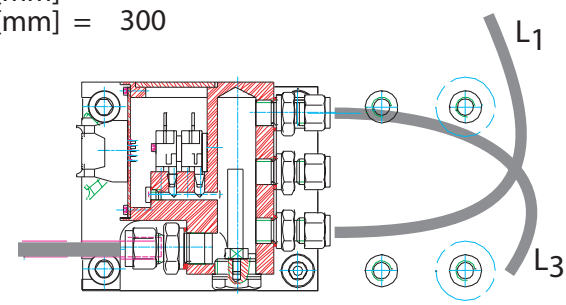




DT type = **MB4/4R** (services at RIGHT)

FRONT manifold		REAR manifold	
L_1 [mm] =	300	L_1 [mm] =	300
L_2 [mm] =	-	L_2 [mm] =	-
L_3 [mm] =	300	L_3 [mm] =	300
L_{pp} [mm] =	tbd		





Note: for MB4/4 the length L_{pp} might be different for left hemisphere ("sx") and right hemisphere ("dx")

Gas Manifold: MB4/8,12

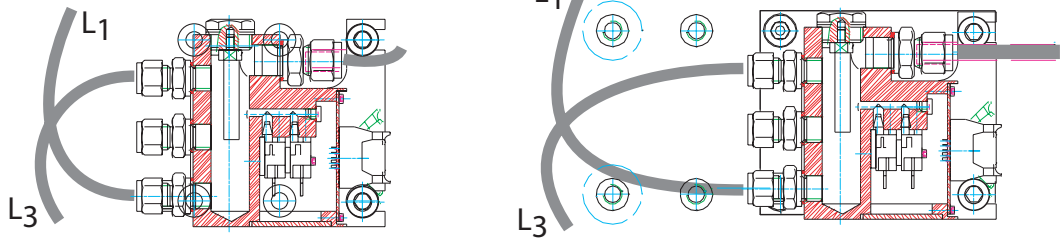
Mounting of Gas Manifold on CMS DT Muon chamber

030730, update 050517
G. Fetchenhauer,
B. Philipps,
H. Reithler

(For definition of variables, see pages manifold_02 and _03.)

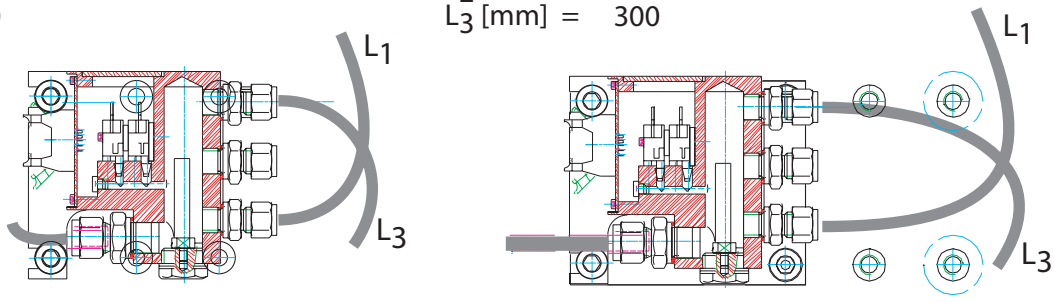
DT type = **MB4/8,12sxL** (left hemisphere, services at LEFT)

	FRONT manifold	REAR manifold
L_1 [mm] =	315	310
L_2 [mm] =	-	-
L_3 [mm] =	280	310
L_{pp} [mm] =	tbd	



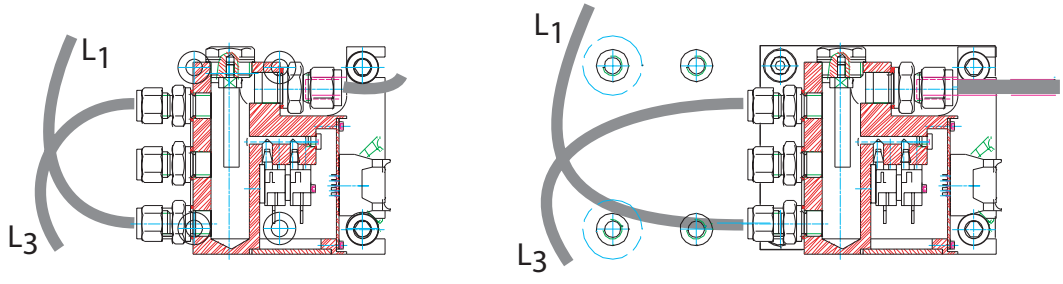
DT type = **MB4/8,12sxR** (left hemisphere, services at RIGHT)

	FRONT manifold	REAR manifold
L_1 [mm] =	300	315
L_2 [mm] =	-	-
L_3 [mm] =	300	300
L_{pp} [mm] =	tbd	



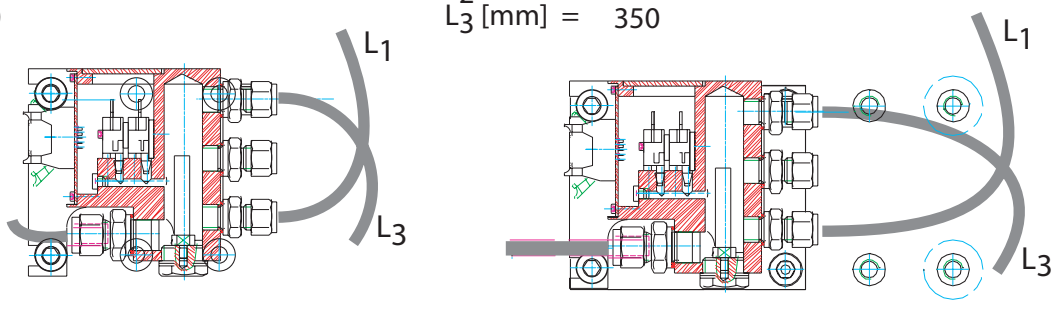
DT type = **MB4/8,12dxL** (right hemisphere, services at LEFT)

	FRONT manifold	REAR manifold
L_1 [mm] =	315	350
L_2 [mm] =	-	-
L_3 [mm] =	280	300
L_{pp} [mm] =	tbd	



DT type = **MB4/8,12dxR** (right hemisphere, services at RIGHT)

	FRONT manifold	REAR manifold
L_1 [mm] =	315	300
L_2 [mm] =	-	-
L_3 [mm] =	300	350
L_{pp} [mm] =	tbd	



Note: for MB4/8,12, left hemisphere ("sx"), right hemisphere ("dx") are relevant, not "+Z", "-Z"

Gas Manifold: MB4/9,11

Mounting of Gas Manifold on CMS DT Muon chamber

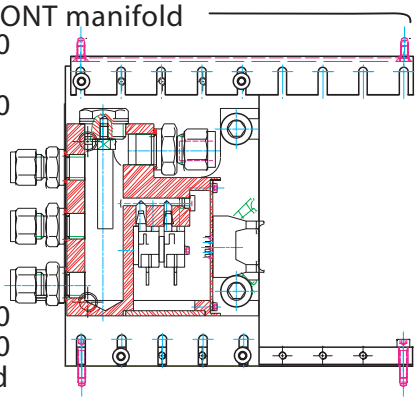
030730, update 050517
G. Fetchenhauer,
B. Philipps,
H. Reithler

(For definition of variables, see pages manifold_02 and _03.)

DT type = **MB4/9,11L** (services at LEFT)

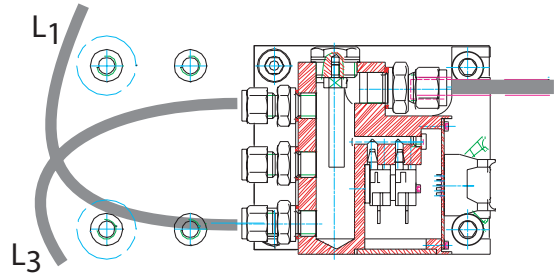
FRONT manifold

L_1 [mm] =	240
L_2 [mm] =	-
L_3 [mm] =	240
N_{tl} =	1
N_{tp} =	1
N_{bp} =	2
N_{bb} =	1
L_t [mm] =	360
L_b [mm] =	360
L_{pp} [mm] =	tbd



REAR manifold

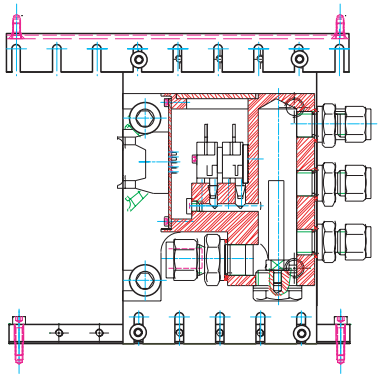
L_1 [mm] =	300
L_2 [mm] =	-
L_3 [mm] =	300



DT type = **MB4/9,11R** (services at RIGHT)

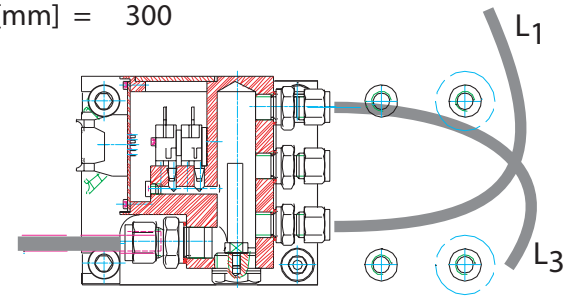
FRONT manifold

L_1 [mm] =	240
L_2 [mm] =	-
L_3 [mm] =	240
N_{tl} =	2
N_{tp} =	1
N_{bp} =	1
N_{bb} =	1
L_t [mm] =	360
L_b [mm] =	360
L_{pp} [mm] =	tbd



REAR manifold

L_1 [mm] =	300
L_2 [mm] =	-
L_3 [mm] =	300



Gas Manifold: MB4/10

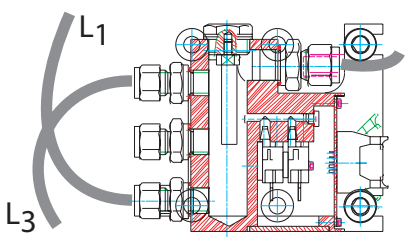
Mounting of Gas Manifold on CMS DT Muon chamber

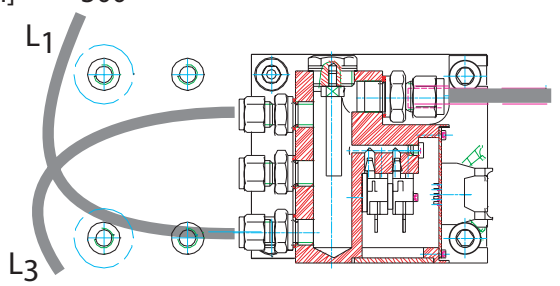
(For definition of variables, see pages manifold_02 and _03.)

030730, update 040731
G. Fetchenhauer,
B. Philipps,
H. Reithler

DT type = **MB4/10sxL** (left hemisphere, services at LEFT)

FRONT manifold		REAR manifold	
L_1 [mm] =	300	L_1 [mm] =	300
L_2 [mm] =	-	L_2 [mm] =	-
L_3 [mm] =	300	L_3 [mm] =	300
L_{pp} [mm] =	tbd		

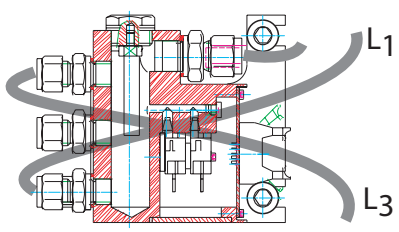


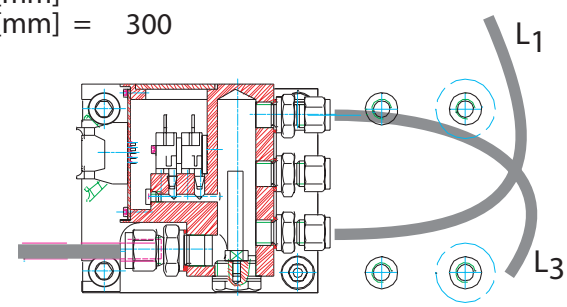


DT type = **MB4/10sxR** (left hemisphere, services at RIGHT)

FRONT manifold		REAR manifold	
L_1 [mm] =	430	L_1 [mm] =	300
L_2 [mm] =	-	L_2 [mm] =	-
L_3 [mm] =	430	L_3 [mm] =	300
L_{pp} [mm] =	tbd		

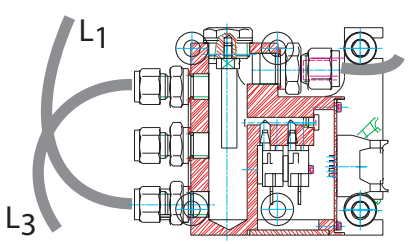
Note unusual orientation of the manifold, here. Requires elbow fittings. Its fixation is tbd.

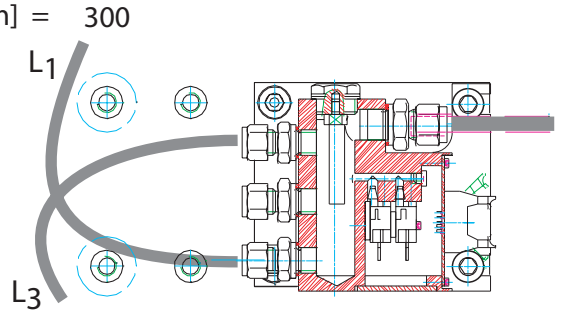




DT type = **MB4/10dxL** (right hemisphere, services at LEFT)

FRONT manifold		REAR manifold	
L_1 [mm] =	300	L_1 [mm] =	300
L_2 [mm] =	-	L_2 [mm] =	-
L_3 [mm] =	300	L_3 [mm] =	300
L_{pp} [mm] =	tbd		

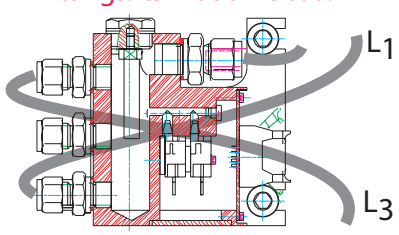


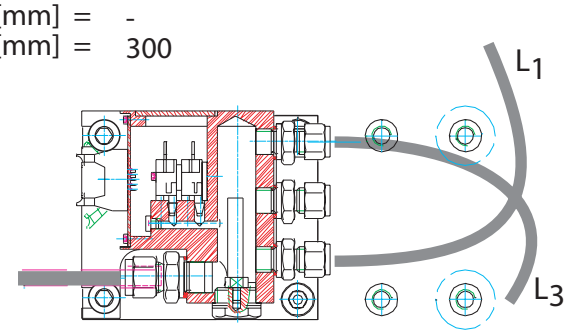


DT type = **MB4/10dxR** (right hemisphere, services at RIGHT)

FRONT manifold		REAR manifold	
L_1 [mm] =	430	L_1 [mm] =	300
L_2 [mm] =	-	L_2 [mm] =	-
L_3 [mm] =	430	L_3 [mm] =	300
L_{pp} [mm] =	tbd		

Note unusual orientation of the manifold, here. Requires elbow fittings. Its fixation is tbd.





Note: for MB4/10, left hemisphere ("sx"), right hemisphere ("dx") are relevant, not "+Z", "-Z"

Gas Manifold: MB1 Chimney

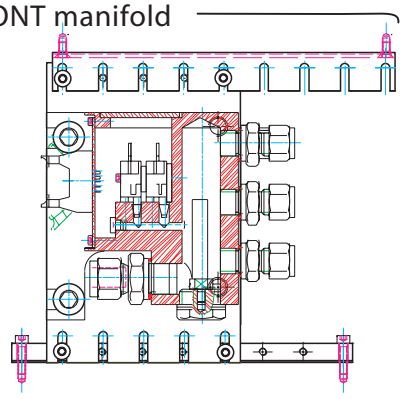
Mounting of Gas Manifold on CMS DT Muon chamber

(For definition of variables, see pages manifold_02 and _03.)

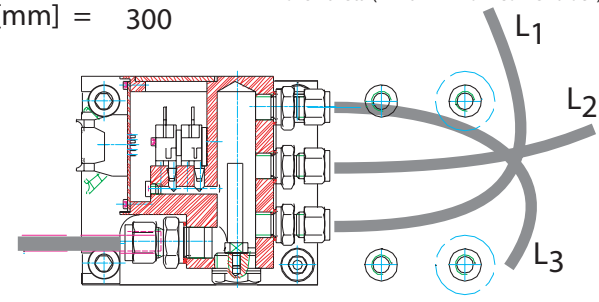
030730, update 050517
G. Fetchenhauer,
B. Philipps,
H. Reithler

DT type = **MB1mR** (-Z, services at RIGHT) it is MB-1/1/3

FRONT manifold		REAR manifold	
L_1 [mm] =	250	L_1 [mm] =	300
L_2 [mm] =	660	L_2 [mm] =	810
L_3 [mm] =	280	L_3 [mm] =	300
N_{tl} =	5		
N_{tp} =	1		
N_{bp} =	1		
N_{bb} =	3		
L_t [mm] =	310		
L_b [mm] =	310		
L_{pp} [mm] =	tbd		



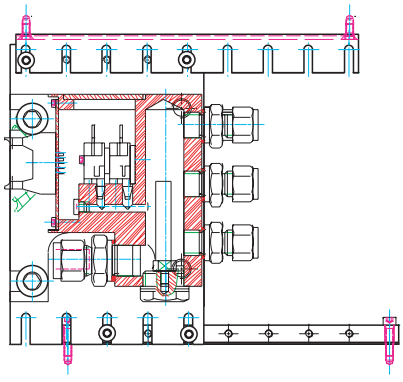
L2: pass under HV conn. of SLphi and above SLtheta; attach to cover frame of SL theta (~140 mm from corner block)



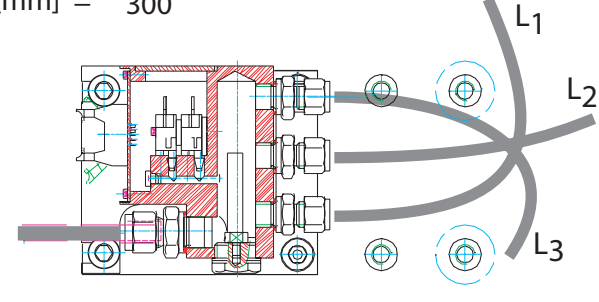
does not exist

DT type = **MB1pR** (+Z, services at RIGHT) it is MB+1/1/4

FRONT manifold		REAR manifold	
L_1 [mm] =	310	L_1 [mm] =	310
L_2 [mm] =	655	L_2 [mm] =	820
L_3 [mm] =	300	L_3 [mm] =	300
N_{tl} =	5		
N_{tp} =	1		
N_{bp} =	1		
N_{bb} =	5		
L_t [mm] =	310		
L_b [mm] =	310		
L_{pp} [mm] =	tbd		



L2: pass under HV conn. of SLphi and above SLtheta; attach to cover frame of SL theta (~140 mm from corner block)



Gas Manifold: MB2 Chimney

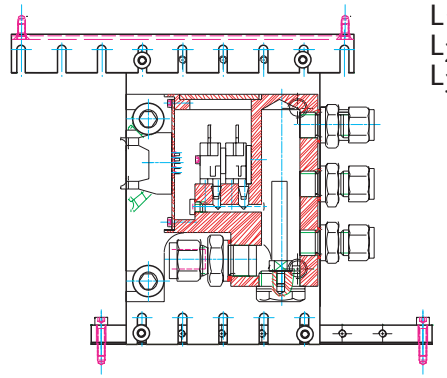
Mounting of Gas Manifold on CMS DT Muon chamber

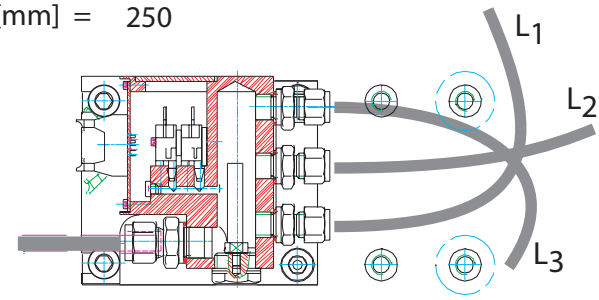
(For definition of variables, see pages manifold_02 and _03.)

030730, update 050517
G. Fetchenhauer,
B. Philipps,
H. Reithler

DT type = **MB2mR** (-Z, services at RIGHT) - it is MB-1/2/3

FRONT manifold		REAR manifold	
L_1 [mm] =	270	L_1 [mm] =	340
L_2 [mm] =	640	L_2 [mm] =	840
L_3 [mm] =	270	L_3 [mm] =	250
N_{tl} =	2		
N_{tp} =	1		
N_{bp} =	1		
N_{bb} =	3		
L_t [mm] =	360		
L_b [mm] =	360		
L_{pp} [mm] =	tbd		

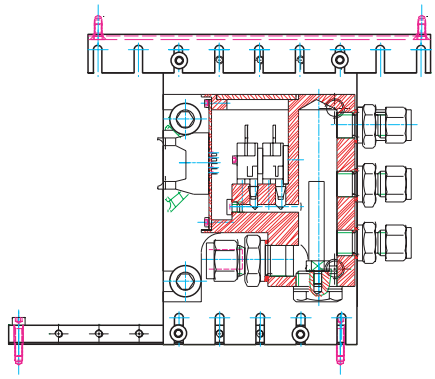


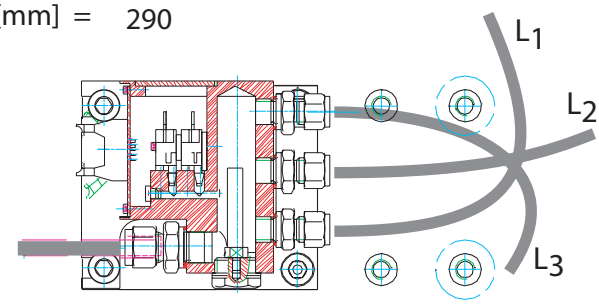


does not exist

DT type = **MB2pR** (+Z, services at RIGHT) - it is MB+1/2/4

FRONT manifold		REAR manifold	
L_1 [mm] =	300	L_1 [mm] =	340
L_2 [mm] =	680	L_2 [mm] =	810
L_3 [mm] =	240	L_3 [mm] =	290
N_{tl} =	3		
N_{tp} =	1		
N_{bp} =	2		
N_{bb} =	1		
L_t [mm] =	360		
L_b [mm] =	360		
L_{pp} [mm] =	tbd		





NOTE: The MB2 chambers have the threaded holes in the SL frames ~2 mm shallower than nominal. Need special screws, here

Gas Manifold: MB3 Chimney

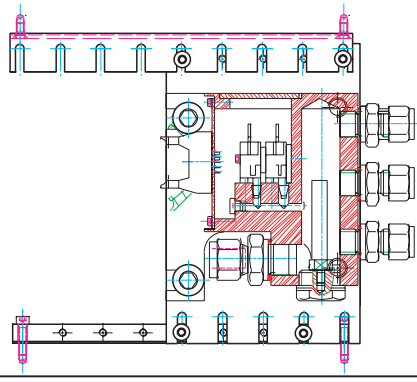
Mounting of Gas Manifold on CMS DT Muon chamber

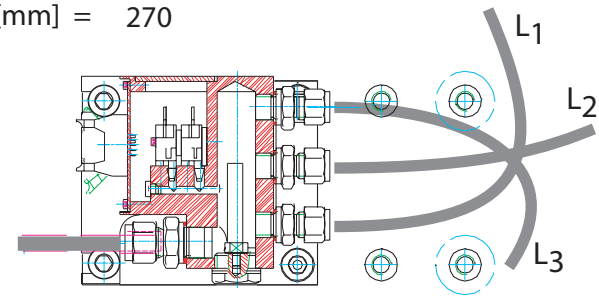
(For definition of variables, see pages manifold_02 and _03.)

030730, update 050517
G. Fetchenhauer,
B. Philipps,
H. Reithler

DT type = **MB3mR** (-Z, services at RIGHT) - it is MB-1/3/3

FRONT manifold		REAR manifold	
L_1 [mm] =	280	L_1 [mm] =	300
L_2 [mm] =	650	L_2 [mm] =	840
L_3 [mm] =	240	L_3 [mm] =	270
N_{tl} =	1		
N_{tp} =	1		
N_{bp} =	2		
N_{bb} =	1		
L_t [mm] =	360		
L_b [mm] =	360		
L_{pp} [mm] =	tbd		



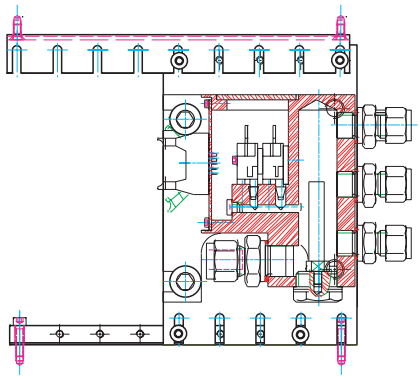


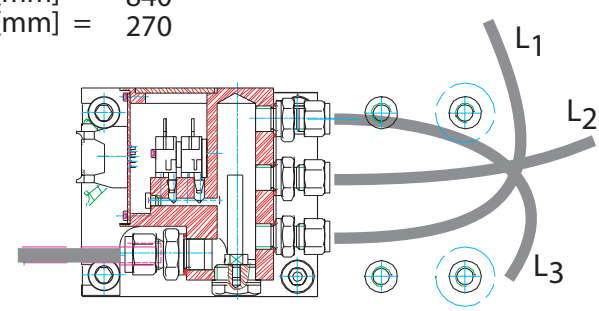
NOTE: Measured on the "+Z" chamber, since the MB3 chambers are the same for +Z and -Z ("unisex").

does not exist

DT type = **MB3pR** (+Z, services at RIGHT) - it is MB+1/3/4

FRONT manifold		REAR manifold	
L_1 [mm] =	280	L_1 [mm] =	300
L_2 [mm] =	650	L_2 [mm] =	840
L_3 [mm] =	240	L_3 [mm] =	270
N_{tl} =	1		
N_{tp} =	1		
N_{bp} =	2		
N_{bb} =	1		
L_t [mm] =	360		
L_b [mm] =	360		
L_{pp} [mm] =	tbd		





Gas Manifold: MB4 Chimney

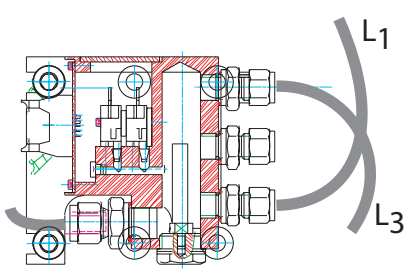
Mounting of Gas Manifold on CMS DT Muon chamber

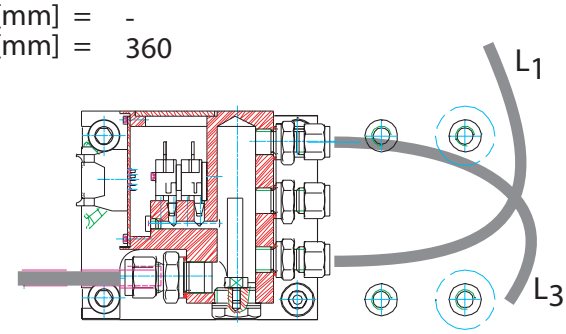
(For definition of variables, see pages manifold_02 and _03.)

030730, update 050517
G. Fetchenhauer,
B. Philipps,
H. Reithler

DT type = MB4dxR (right hemisphere, services at RIGHT)

FRONT manifold		REAR manifold	
L_1 [mm] =	340	L_1 [mm] =	330
L_2 [mm] =	-	L_2 [mm] =	-
L_3 [mm] =	330	L_3 [mm] =	360
L_{pp} [mm] =	tbd		





Note: MB4 chimney is an MB4/3

Note: for MB4, left hemisphere ("sx"), right hemisphere ("dx") are relevant, not "+Z", "-Z"

Gas Manifold: MB4/4 chimney

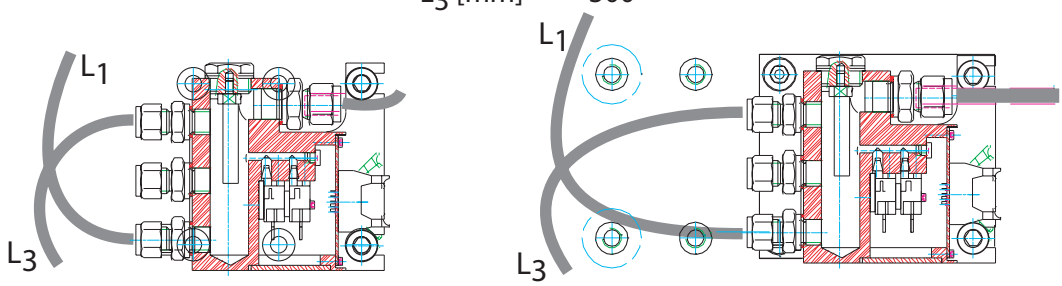
Mounting of Gas Manifold on CMS DT Muon chamber

030730, update 040731
G. Fetchenhauer,
B. Philipps,
H. Reithler

(For definition of variables, see pages manifold_02 and _03.)

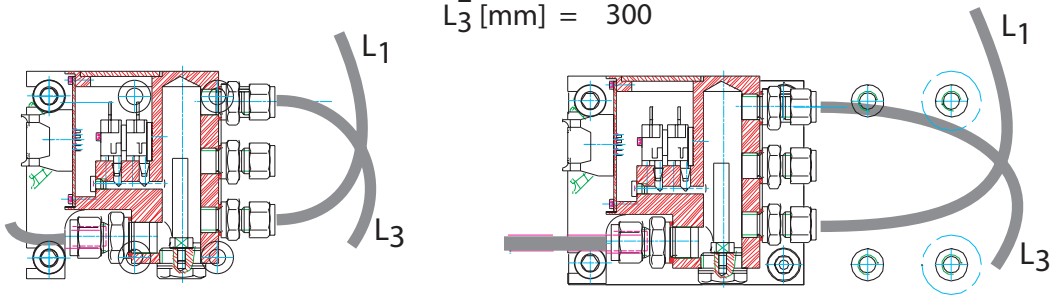
DT type = **MB4/4L** (services at LEFT)

FRONT manifold		REAR manifold	
L_1 [mm] =	300	L_1 [mm] =	300
L_2 [mm] =	-	L_2 [mm] =	-
L_3 [mm] =	300	L_3 [mm] =	300
L_{pp} [mm] =	tbd		



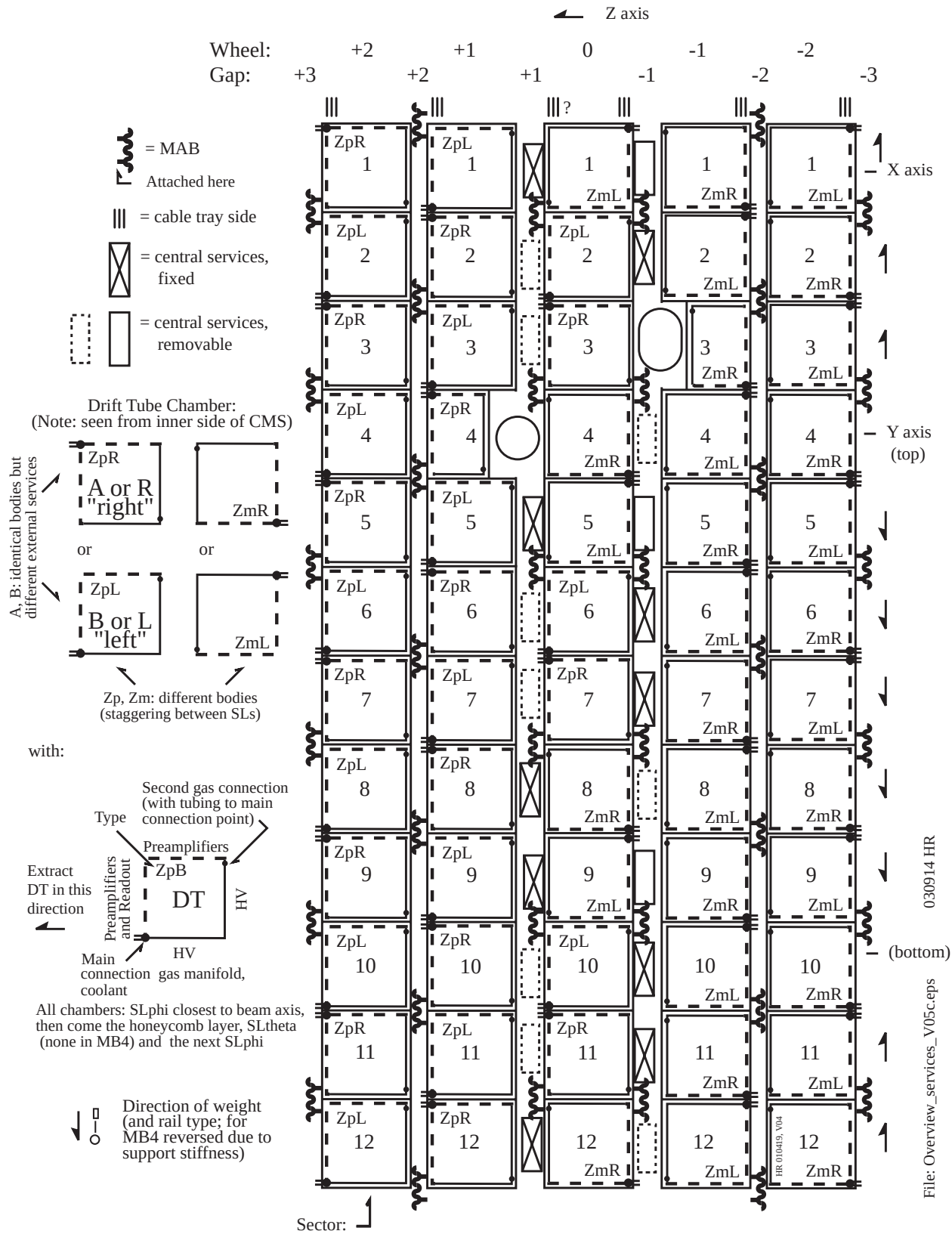
DT type = **MB4/4R** (services at RIGHT)

FRONT manifold		REAR manifold	
L_1 [mm] =	300	L_1 [mm] =	300
L_2 [mm] =	-	L_2 [mm] =	-
L_3 [mm] =	300	L_3 [mm] =	300
L_{pp} [mm] =	tbd		



Note: for MB4/4 the length L_{pp} might be different for left hemisphere ("sx") and right hemisphere ("dx")

Schematic Overview of Services

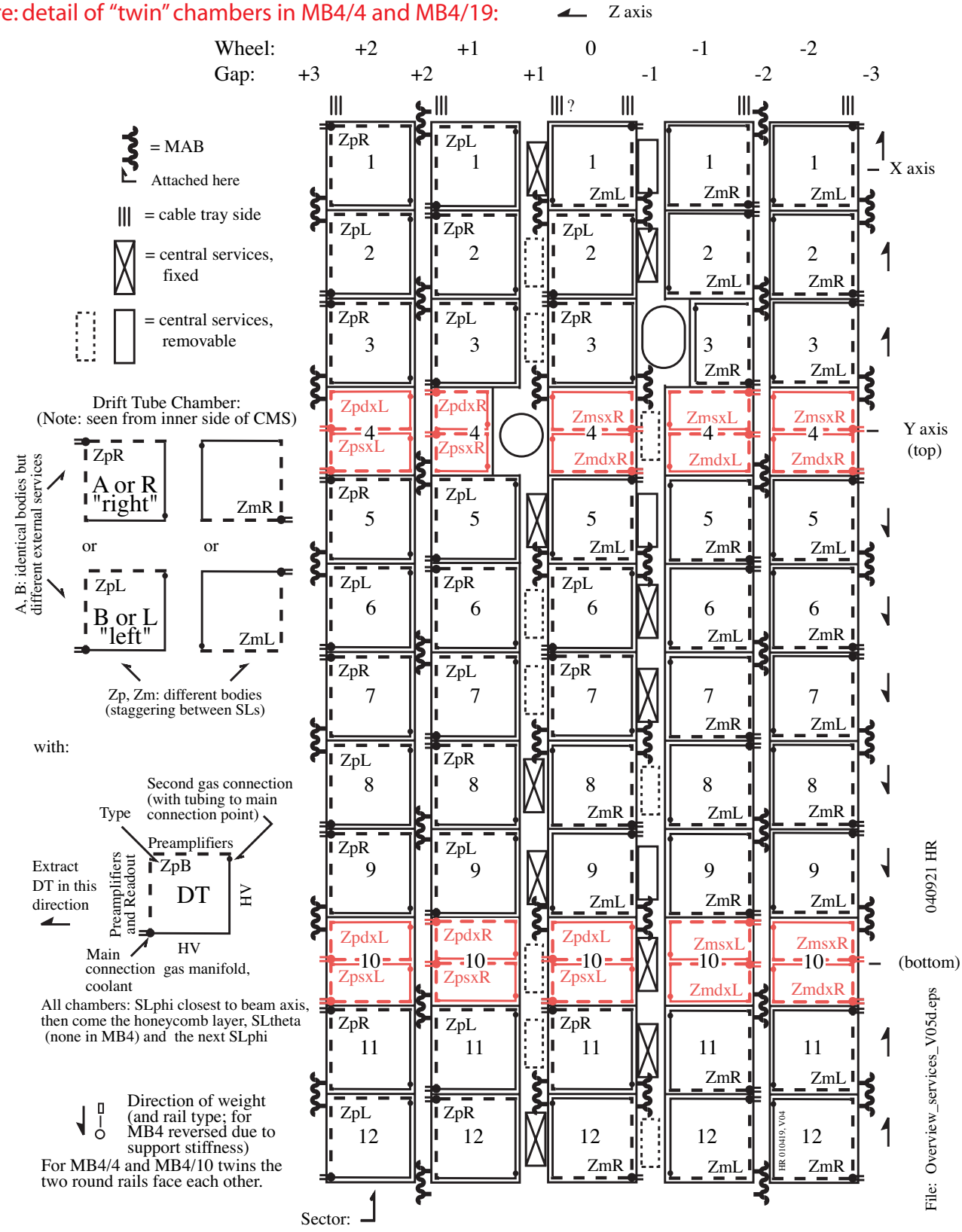


Installation of CMS Barrel Muon Chambers. Sectors as seen from inside. Sectors 4 and 10 have the chambers subdivided in two, at station MB4 (not shown here). The difference between R (or A; right) and L (or B; left) types is the location of gas, coolant, HV and LV external connection; the bodies are identical. The staggering between the SuperLayers is, however, different between the Zp and Zm types (have to extract the chambers in opposite directions in Z+ and Z- wheels, but the wheels have all the same orientation and are made left-right asymmetric to ensure an hermetic coverage in azimuth). The cable trays along the periphery of the wheel are close to the face with the main connections; on the central wheel the Barrel Muon gas and cooling piping is on the Zm side.

Note: details of the subdivision of MB4/4 and MB4/10 are not included here.

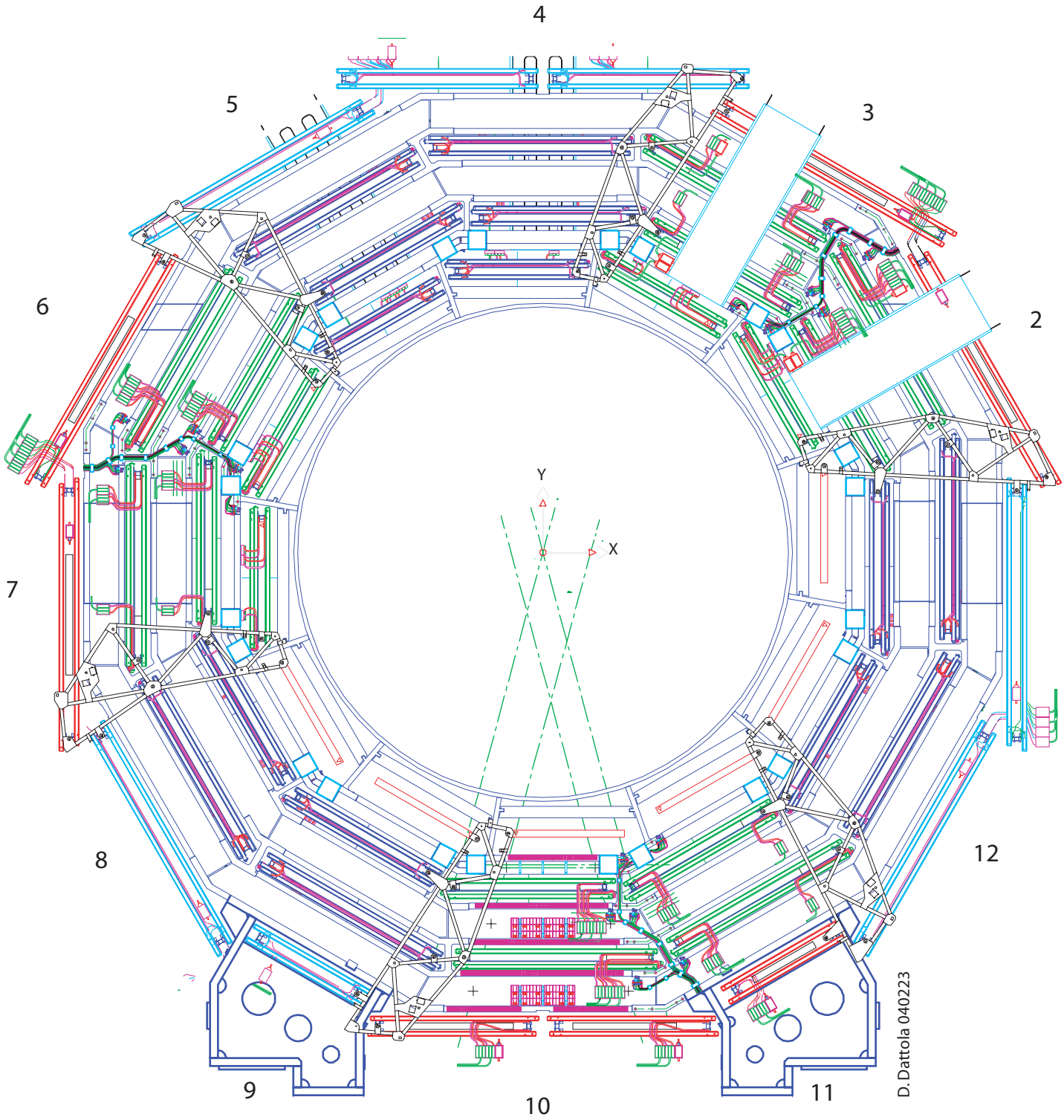
Schematic Overview of Services

Here: detail of "twin" chambers in MB4/4 and MB4/19:



Installation of CMS Barrel Muon Chambers. Sectors as seen from inside. Sectors 4 and 10 have the chambers subdivided in two, as shown here in red, only at station MB4 . The difference between R (or A; right) and L (or B; left) types is the location of gas, coolant, HV and LV external connection; the bodies are identical. The staggering between the SuperLayers is, however, different between the Zp and Zm types (have to extract the chambers in opposite directions in Z+ and Z- wheels, but the wheels have all the same orientation and are made left-right asymmetric to ensure an hermetic coverage in azimuth). The cable and piping trays along the periphery of the wheel are close to the face with the main connections; on the central wheel the Barrel Muon gas and cooling piping is on the Zm side. The "bottom" side of a chamber has one, the "top" side has two SuperLayers (SL) attached to the honeycomb structure (not applicable to MB4 chambers, which have only two SLs).

Central Wheel 0



View of the central wheel, seen from the "+Z" axis.