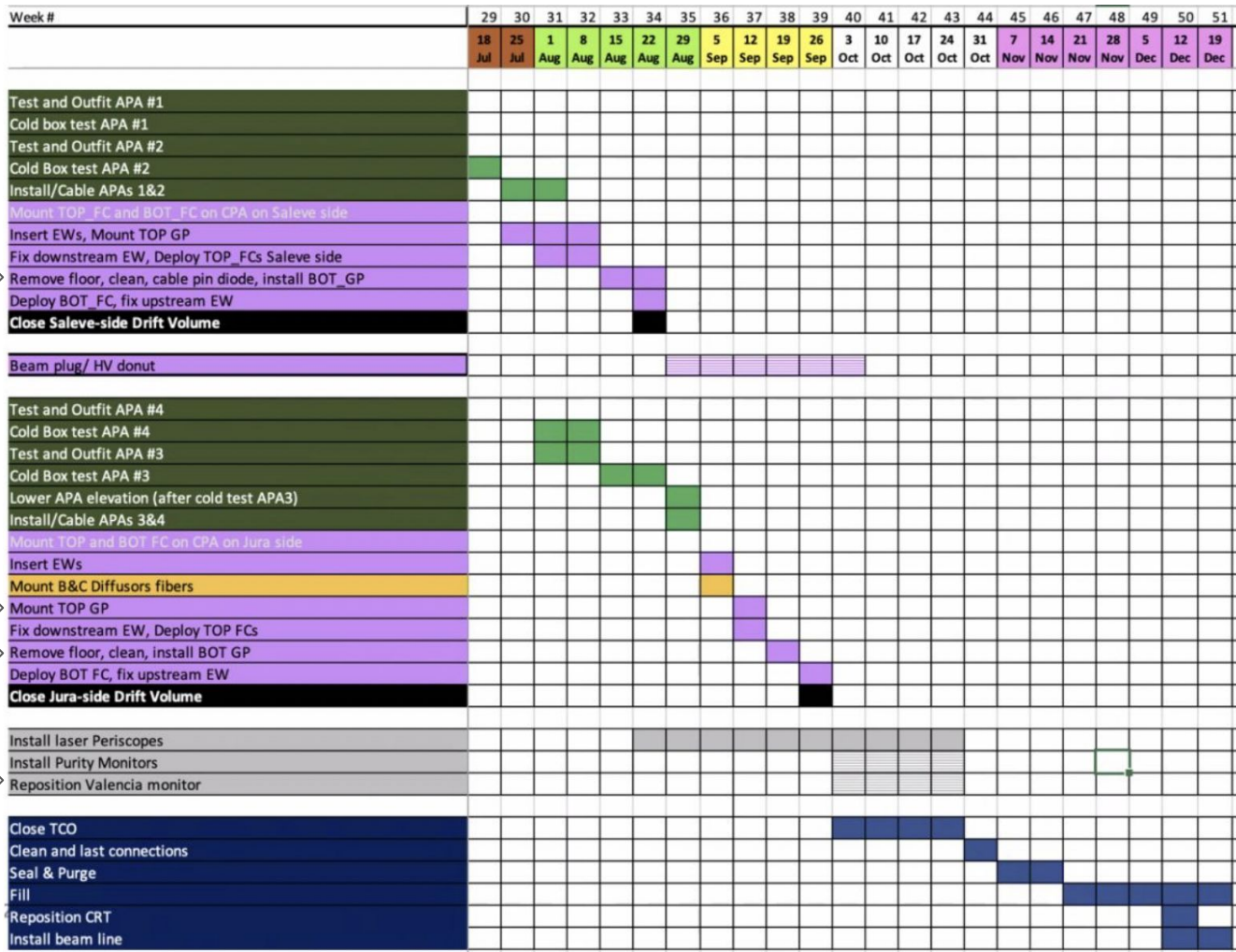


# Temperature Sensors Update

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21/07/2022

# Current Schedule



Install BOTTOM sensors (Saleve)



Install GAS ARRAYS



Install BOTTOM sensors (Jura)

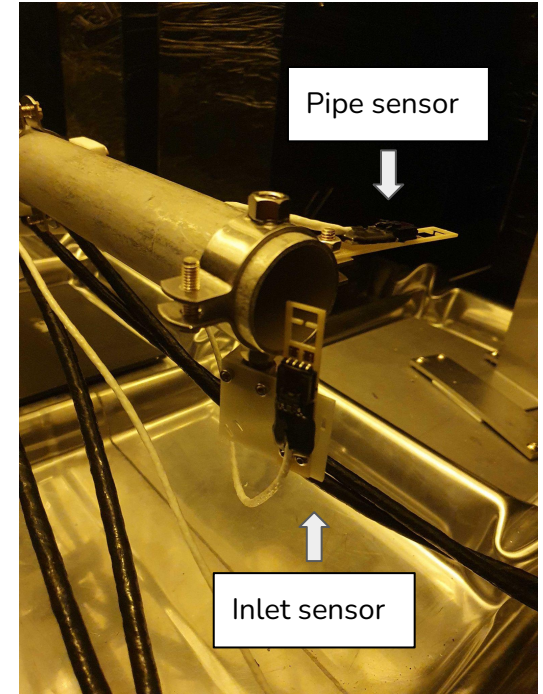
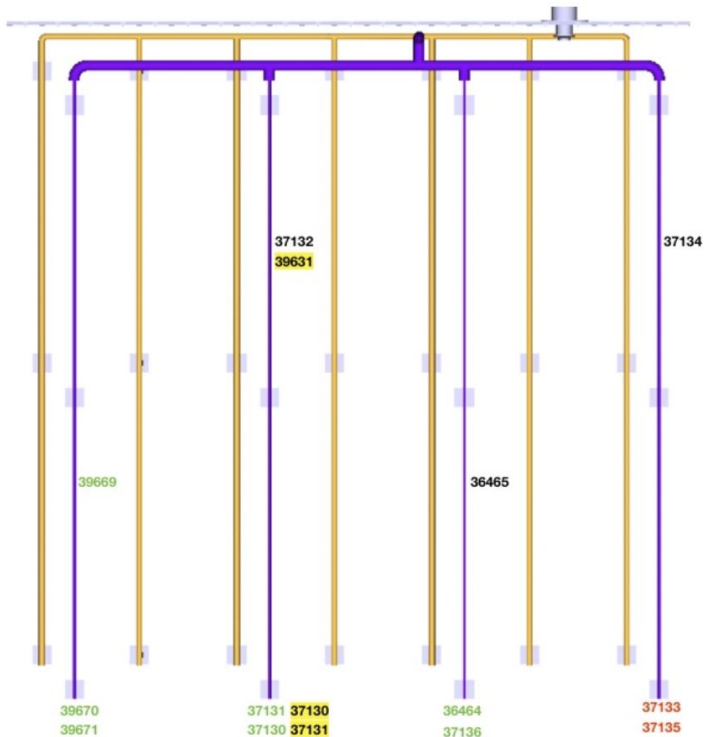


Install TGRADIENT + PUMP sensors



# Bottom sensors: installation

- ❑ We were at CERN at the beginning of March.
- ❑ They will be finally installed when removing the false floor and before deploying the bottom field cage.
- ❑ Material is already at CERN.



# Inlet and Pipe sensors: material



8/12 were mounted on new FR4 boards

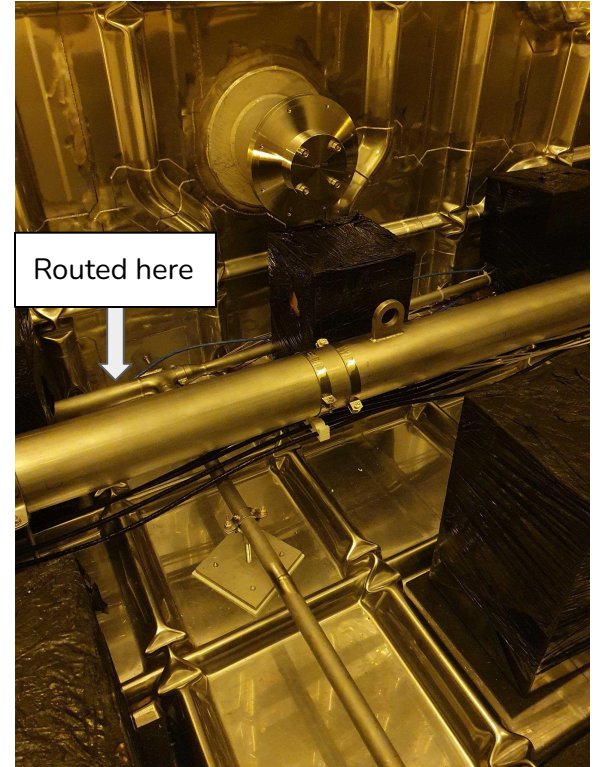
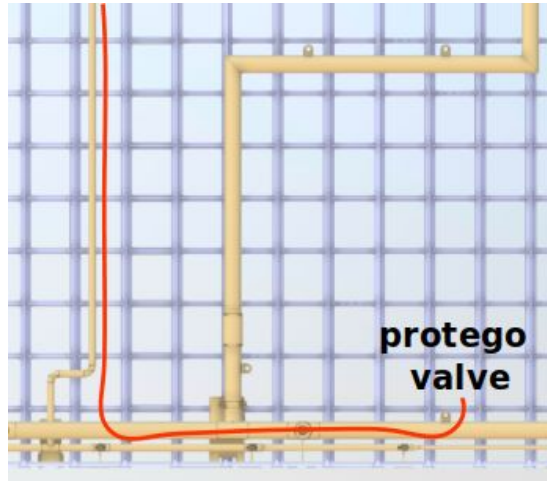
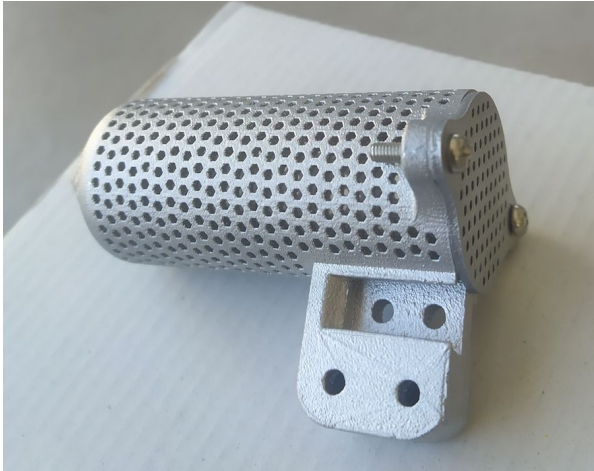


4/12 were replaced and mounted (INLET)

# PUMP sensors: status and installation.

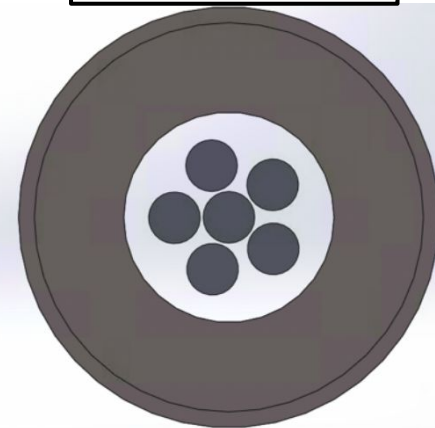
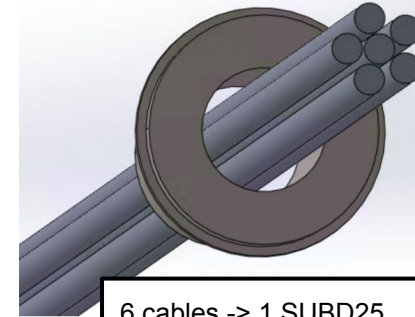
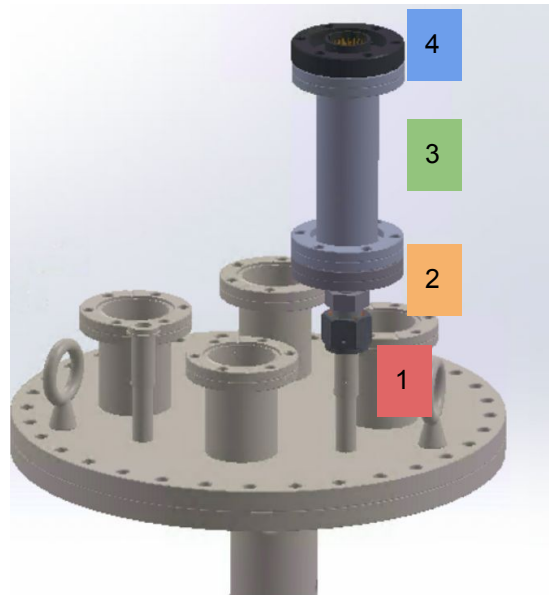
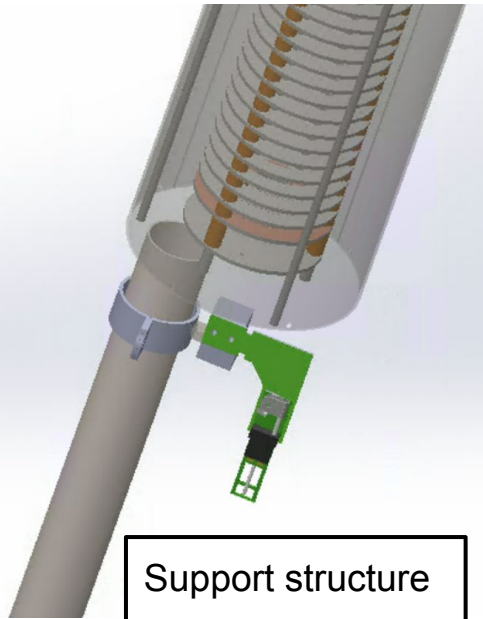
- ❑ Cable installation at CERN in March.
- ❑ Support structure and sensors will be installed just before the TCO closing (end August).
- ❑ Support structures are in the production phase at IFIC.

9.1



# Purity Monitors sensors: status and installation.

- (1) VCR ½" -> CF40 (ordered)
- (2) CF40 -> CF63 (already at IFIC)
- (3) CF63 straight connector (already at IFIC)
- (4) CF63 with 1 SUBD25 (ordered)

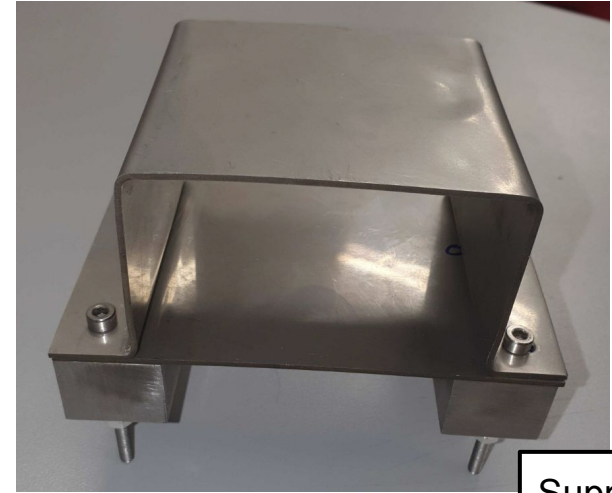


Sensors' positions on PRM.

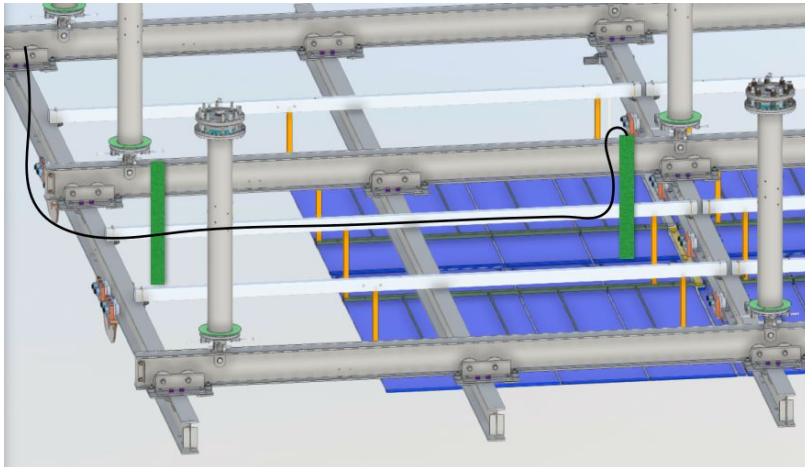


# Gas arrays: status and installation.

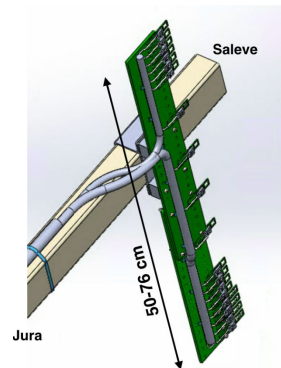
- They will be placed on the beams that support the ground plane.
- Planned to be installed mid August.
- All cables are already produced and FR4 boards in production phase, almost ready to be tested and delivered.



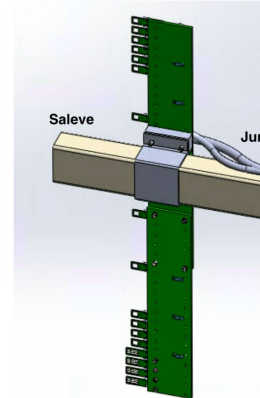
Support



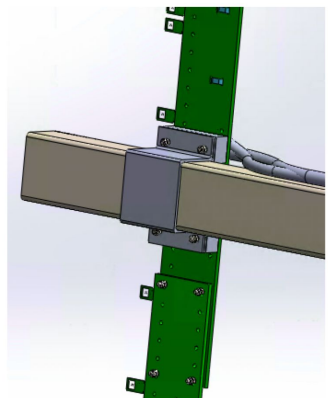
front view



back view

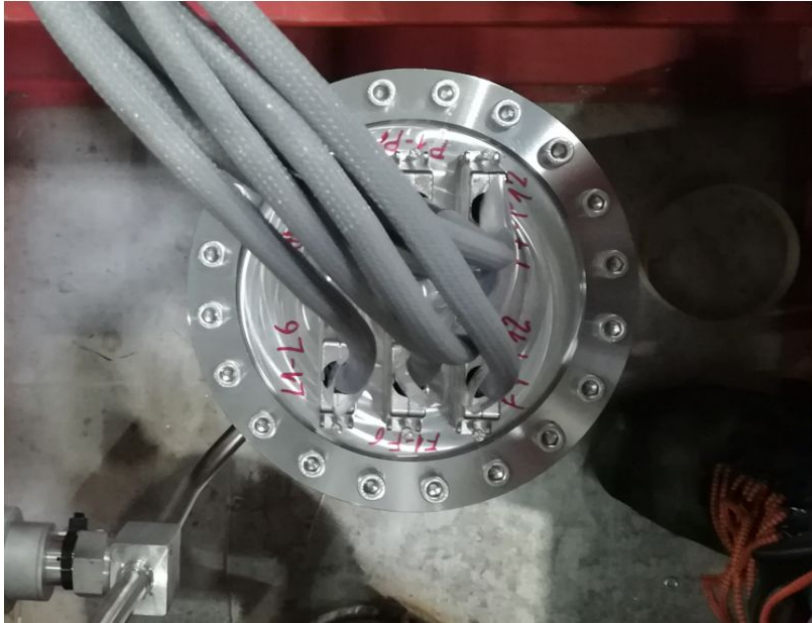


back view



# Gas arrays: cable routing.

- Every SUBD-25 reads out 6 sensors: 18 sensors/GArray -> 6 SUBD-25.
- There is a CF160 with 6 SUBD25: 12 bottom (2 broken) + 12 pipe (replaced) + 6 membrane (stayed) + 6 level (removed) -> 6 empty -> 2 for PUMP sensors'
- We have **acquired** another CF160 with 6 SUBD25 connectors for the Gas arrays.



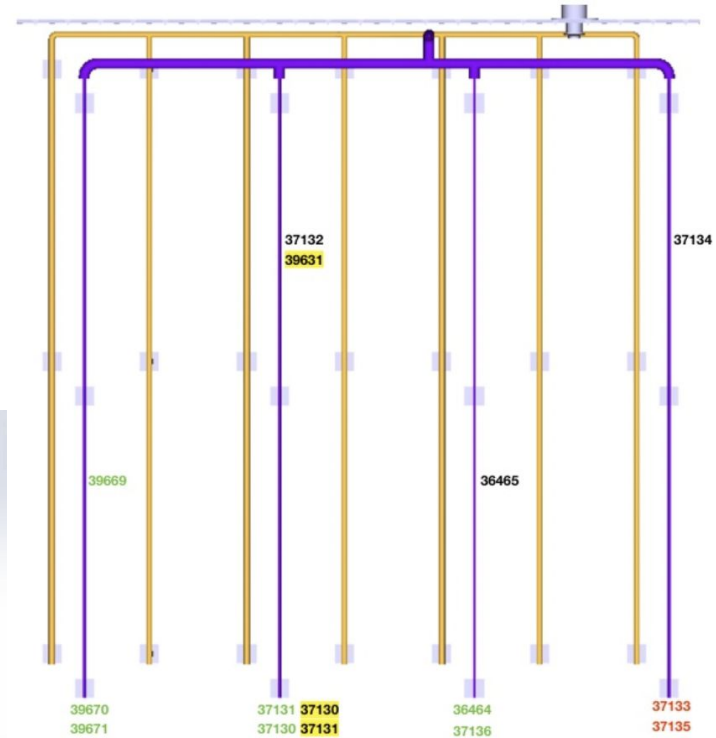
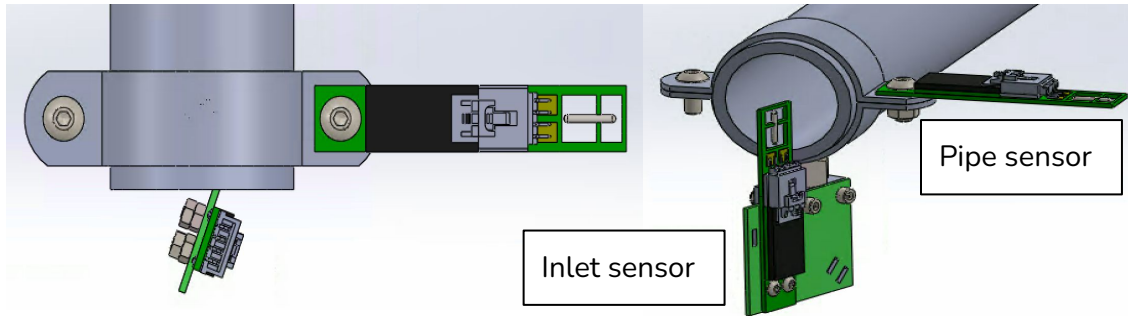


# Summary and Conclusions

- ❑ Most of the cables are already routed and ready to plug in the sensors, except gas arrays' and purity monitors'.
- ❑ All needed sensors are already calibrated. T-Gradient and Bottom Sensors recalibration show a very good agreement with previous calibration.
- ❑ Material for the first sensors that will be installed (bottom sensors) is already at CERN.
- ❑ Left material for the pump sensors' is in production phase at IFIC.
- ❑ Material for gas arrays is almost ready: only FR4 boards are not ready still.
- ❑ Material for purity monitor sensors' is ordered or already here.
- ❑ All flanges are ordered and cable routing is decided.

# Bottom sensors: overview

- ProtoDUNE 2018 sensors have been recalibrated.
- 8/12 have been mounted on the new FR4 boards and 4/12 have been replaced by new ones.
- All 4 INLET are new sensors.



CalibSetNumber	Ref13	Ref14	S1	S2	S3	S4	S5	S6	S7	S8	S9	S10	S11	S12	Mounted?	Calibrated?	Delivered?
Pipe1	44123	44124	39671	37131	37136	37135	39669	39631	36463	37134	39670	37130	36467	37133			
Pipe1 (NAMES)	TGrad1	TGrad2	1-U	2-U	3-U	4-U	1-M	2-M	3-M	4-M	1-D	2-D	3-D	4-D			
Pipe-TGrad1 (NAMES)	44123	44124	39671	37131	39666	37136	39669	39665	39631	39670	39664	37130	37133	39667			
Pipe-TGrad1 (NAMES)	TGrad1	TGrad2	1-U.2	2-U.2	TGrad4-s5	3-U.2	4-U.2	TGrad4-s6	1-M.2	2-M.2	TGrad4-s7	3-M.2	4-M.2	TGrad4-s8			
Pipe2	44123	44124	39671	37131	49319	37136	39669	49320	39631	39670	49321	37130	37133	49322			
Pipe2 (NAMES)	TGrad1	TGrad2	1-U.2	2-U.2	1-I	3-U.2	4-U.2	2-I	1-M.2	2-M.2	3-I	3-M.2	4-M.2	4-I			

In the PIPE1, all sensors were with the old borads. In the PIPE2, the best U, M and D sensors (labelled in the table in light green) were installed on new longer boards. They are labelled as U.2, M.2 or D.2 (but kept in the board 1-U...) to emphasize this change of board.