TEST SETUP MANAGEMENT

1. **Free the reaction frame from previous specimen**
2. **Please check if the cylinders are centered. The total stroke of the cylinder is 22.8 cm. If necessary, move the blue beam.**
3. **Put the metal plates with the special edges for the small rollers.**

4. **Put the rollers**

5. **Put the metal plates on which the specimen is slid under the reaction frame**

6. The specimen is fixed in the steel supports by wedges and screw nails

7. **The specimen is lifted by the crane together with the steel supports and it is sat on the metal plates on which it is slid under the reaction frame**

8. **The specimen (supported in the steel supports) is pushed under the reaction frame**

9. **When the specimen is centered under the reaction frame, it is lifted by the pulleys attached to the reaction frame above (2 pieces of 5 tons each) with the belts that pass through the bottom timber beam of the specimen (in which cross-halvings were done in order to be able to take out the belt, once the specimen is laid on the reaction slab)**

10. **The steel supports are removed. At least 3 people are needed for this, unless you can disassemble the support and make it easier to lift.**

11. **The metal plates on which the specimen is slid are removed, together with the rollers and the other metal plates with edges for rollers**

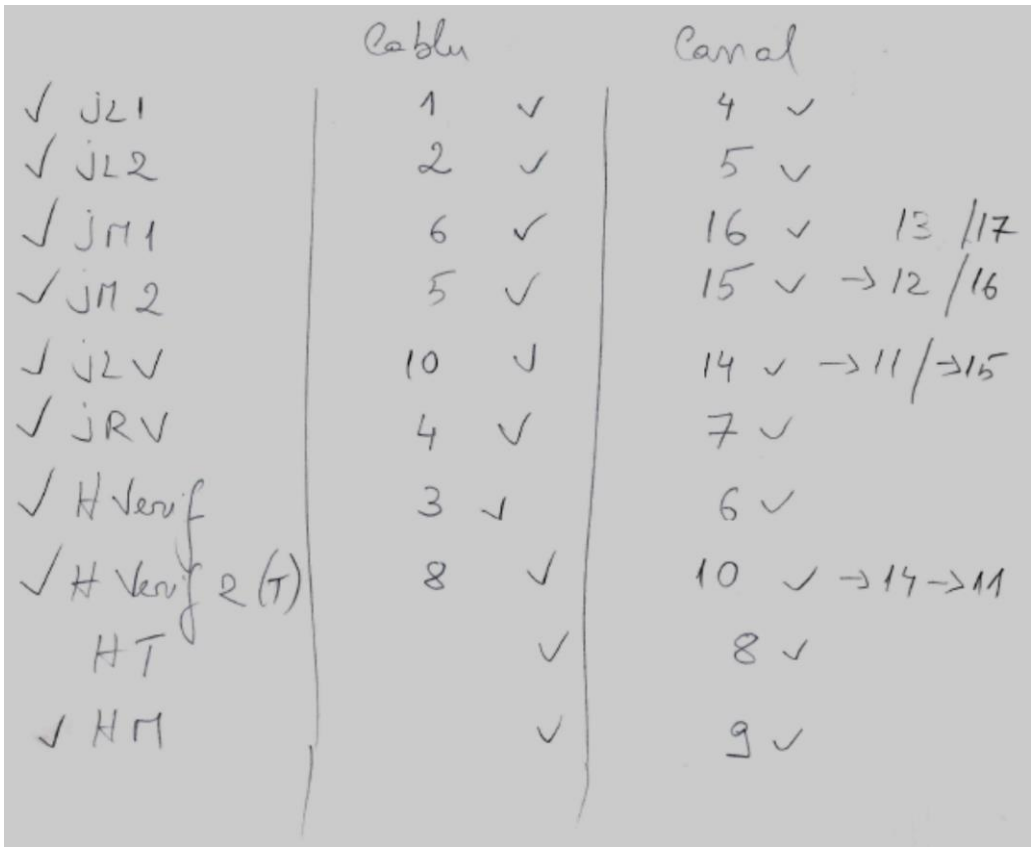
12. **The specimen is released on the reaction slab, paying attention to the centering on both x and y directions (in plan) with a reference to the middle of the upper blue loading beam. Under the specimen, a 3 m timber beam is put, in order to reach the necessary height.**

13. **The specimen is centered at the bottom and fixed by bolts to the reaction slab (30 min)**

14. **The specimen is fixed in horizontal direction at the bottom, with bolts and stoppers and the horizontal bolts to be pushed until needed (15 min)**

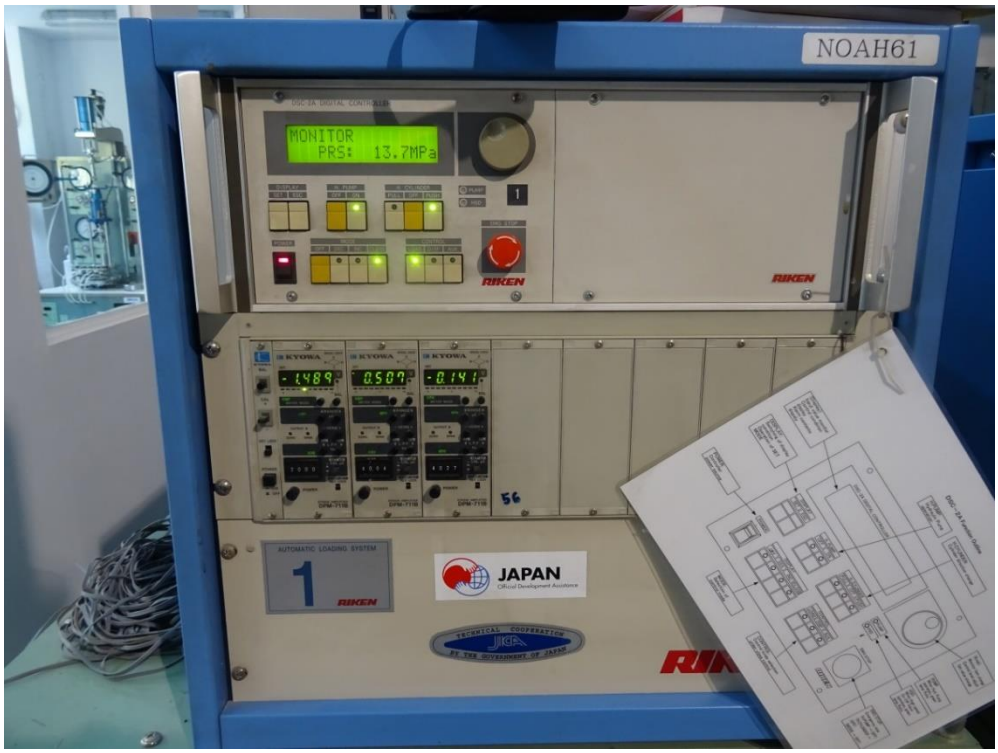
15. **Verticality of the wall is checked**
16. **At the upper part, the specimen is left unfixed, being fixed only after the vertical load is applied.**
17. **The displacement transducers are mounted, according to the setup scheme**

18. **Connect the transducers to the switch box with the cables (be careful with the number of the cables, to be written on a piece of paper)**
19. **Write down the number of the channels corresponding to the number of the cables**



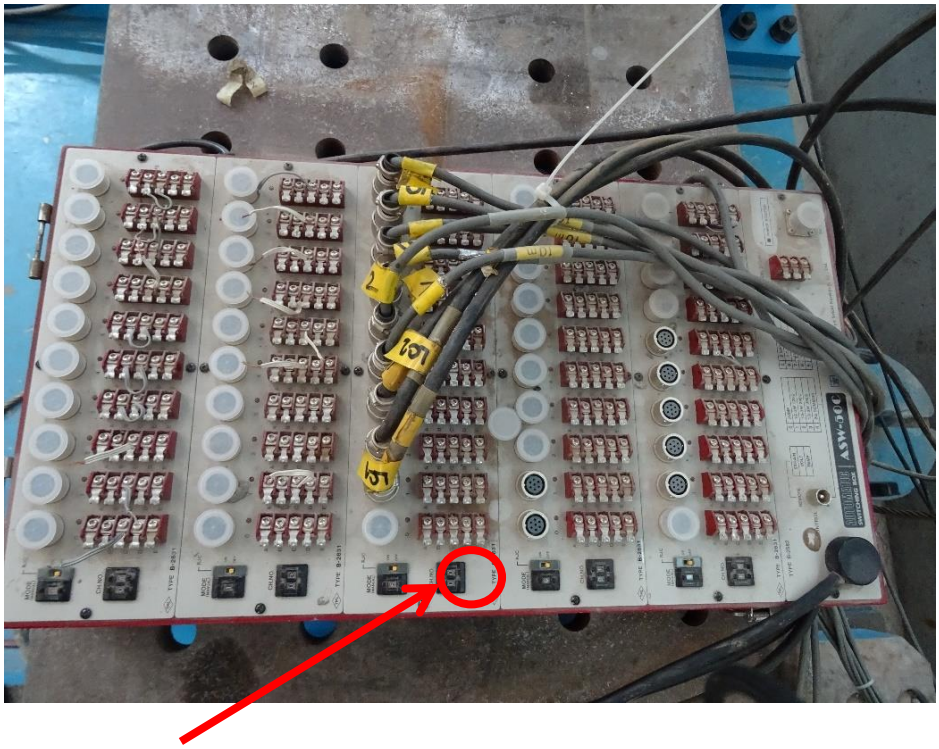
20. **Check the big plug if it is connected to the socket in the small room**
21. **Turn ON electricity, from the two power supplies in the back of the testing hall (each one having a switch ON/OFF)**

22. Turn on the 2 controllers (from behind).



23.Turn ON computers

24. Turn ON the data logger Tokyo Sokki Kenkyojo, model TDS-303, and Switch Box ASW-50C (from behind and from front button)



This is sensor mode corrector (1.000 x CH0….CH9). When it is yellow, it means “disk selector use”. If I select coefficients from software, the yellow switch is turned off (it’s in the yellow position) and it means “manual”

If there are devices (like displacement transducers) with sensor mode preinstalled, the yellow button is “ON” and it means in the software we don’t need to set it from the software.

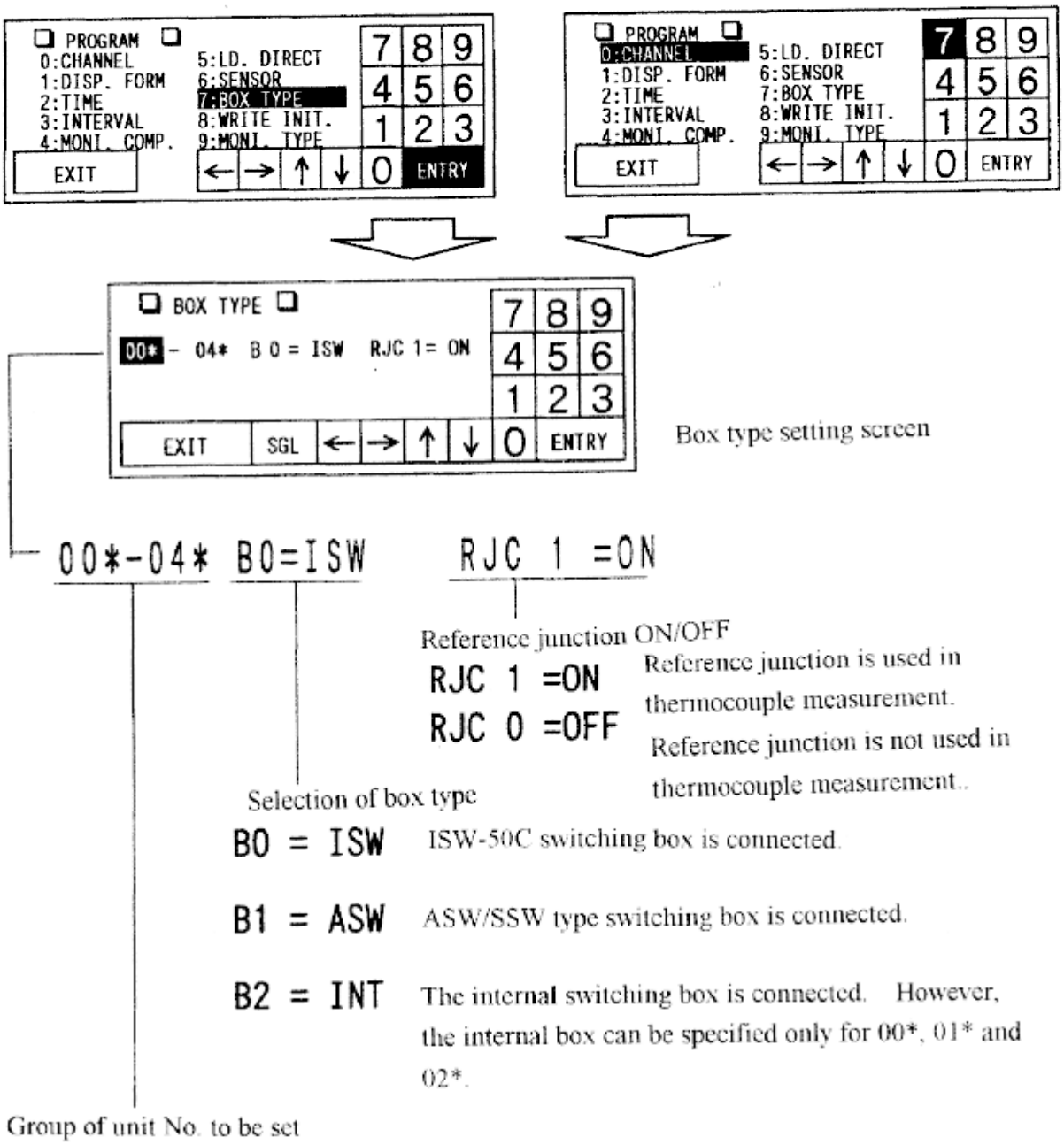
You can also see RJC here…. Relate it to the actuator control.

When no sensor mode is assigned in the software, you do not assign any sensor mode setup to the channel. In this case, you may conduct a measurement with a sensor mode preinstalled in the measuring device instead.

25.Setting and connecting a GP-IB interface

Example of GP-IB cable:

26. Setting the box type (directly on the data logger)



Here, I have B1=ASW

Please note that everytime the data logger is switched off, it forgets this setting

If I have channels occupied on more raws in the switch box, please input them in the beginning of this setting (00*-01*, for example when I have raw 00 and raw 01 occupied in the switch box). Otherwise it will not read the raws. Also, on the switch box, be careful on the numbering of the raws, if there are 2 with same number, the software will give an error.

27. Setting the coefficient, decimal point and unit (page 58/TDS 303) – I will do this from the software directly

For strain gauge:

1. Set the value 2.000/KG as the coefficient for the compensation of a gage factor.
(Example) Gage factor KG=2.13
2.000/2.13=0.939
As a result, set 0.939 as the coefficient.

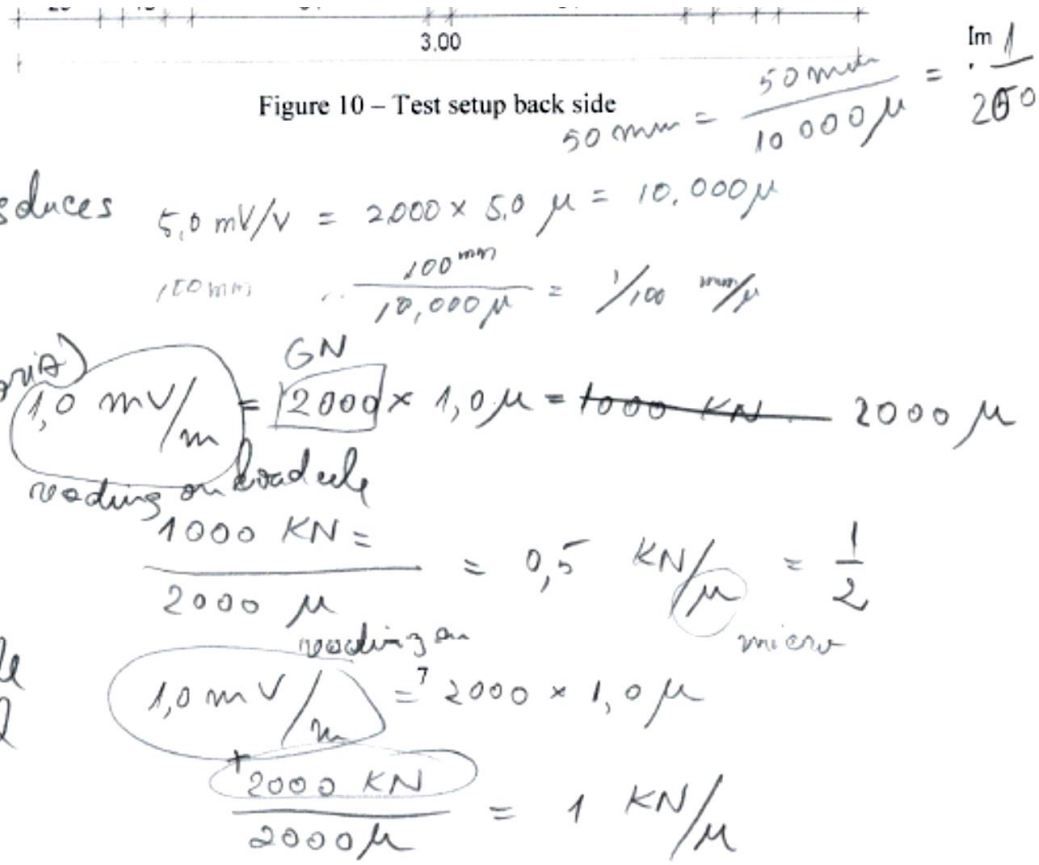
For displacement transducer:

4. In the case of a displacement transducer
(Example) In the case of a displacement transducer with a capacity of 25 mm, 6.25 mV/V,
25/125000 × 10^{-6} strain equals to 0.002.
As a result, set 2,000 as the coefficient, 3 as the decimal point, and mm (1) as the unit.
Then, the displayed value will be a directly read physical quantity.

For load cell (usually coefficient of load cell is the capacity-kN- divided by the sensitivity – mV/V):

3. In the case of a load meter
(For the rated output expressed in mV/V, employ 1 mV/V=2000 × 10^{-6} strain in the computation.)
(Example) In the case of a load cell with a capacity of 5 kN, 2 mV/V,
5 kN/4000 × 10^{-6} strain equals to 0.00125.
As a result, set 1.250 as the coefficient, 3 as the decimal point, and kN (11) as the unit.
Then, the displayed value will be a directly read physical quantity.

The values that I should input to these simple calculations are found on the boxes of transducer or strain gauge/directly on load cell.



Example of displacement transducer data sheet:
CDP 500 mm

変位計 試験成績書
DISPLACEMENT TRANSDUCER TEST DATA

型名 Type	DP-500ES002	容量 Capacity	500 mm	製造番号 Serial No.	BDG09446
試験年月日 Date	2010.5.19	温度 Temperature	23 ℃	湿度 Humidity	34 %

定格出力 : Rated output **** +5000 μV/V
(ひずみ:Strain K=2.00) **** +10000 ×10⁻⁶
**** 0.0500 mm /1×10⁻⁶
校正係数 : Calibration coefficient 0.3 %RO
非直線性 : Non-linearity
入出力端子間抵抗 : Input & output resistance 入力 Input 259.9 Ω 出力 output 347.7 Ω
絶縁抵抗 : Insulation resistance 1000 MΩ以上(DC50V)
入出力ケーブル : Connection cable 0.3 mm² 10 m

TML 株式會社 東京測器研究所
〒140-8560 東京都品川区南大井6−8−2 TEL (03)3763−5611
Tokyo Sokki Kenkyujo Co., Ltd.
8-BAN 2-GO,MINAMI-OHI 6-CHOME, SHINAGAWA-KU, TOKYO, JAPAN 140-8560

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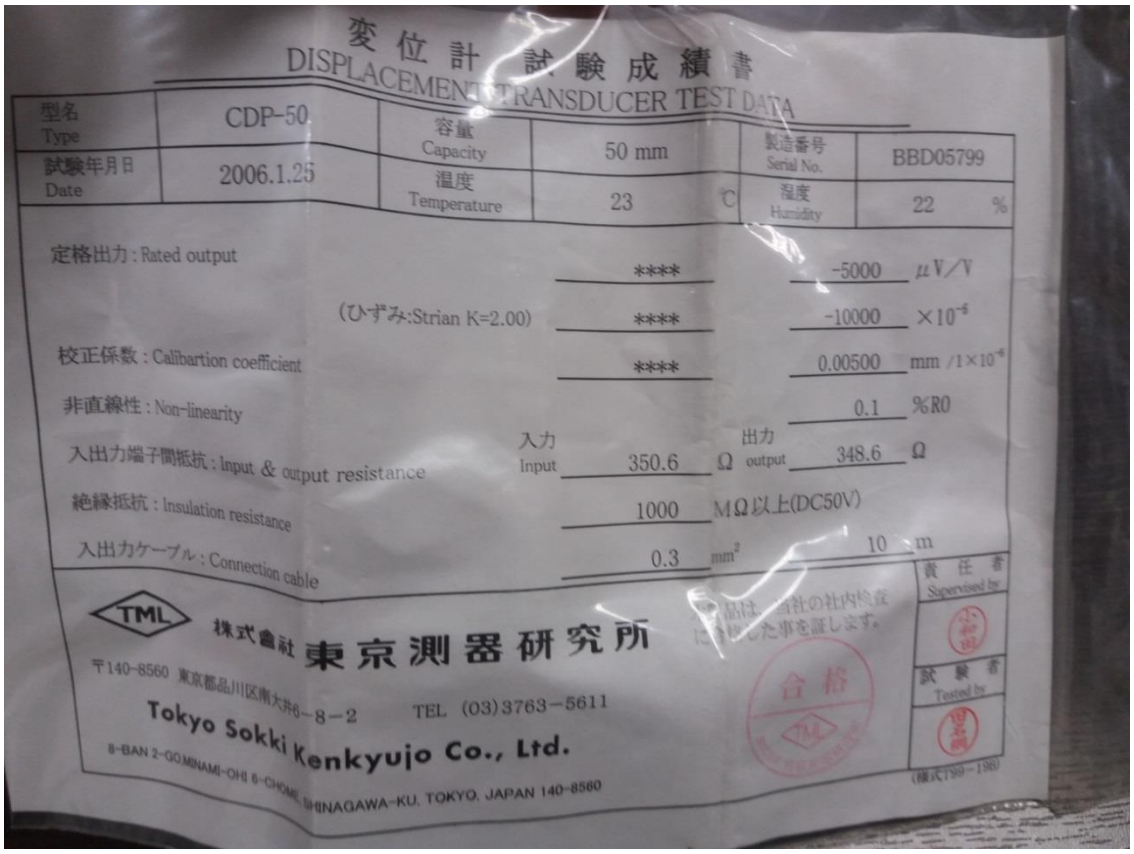
責任者 Supervised by
試験者 Tested by

(様式T99−19B)

CDP 50 mm:



変位計 試験成績書

DISPLACEMENT TRANSDUCER TEST DATA

型名 Type	CDP-50	容量 Capacity	50 mm	製造番号 Serial No.	BBD05799
試験年月日 Date	2006.1.25	温度 Temperature	23 ℃	湿度 Humidity	22 %

定格出力 : Rated output	****	-5000	μV/V
(ひずみ:Strian K=2.00)	****	-10000	$\times 10^{-6}$
校正係数 : Calibartion coefficient	****	0.00500	mm /1×10^{-6}
非直線性 : Non-linearity		0.1	%RO
入出力端子間抵抗 : Input & output resistance	入力 Input 350.6 Ω	出力 output 348.6 Ω	
絶縁抵抗 : Insulation resistance	1000 MΩ以上(DC50V)		
入出力ケーブル : Connection cable	0.3 mm^2	10 m	

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〒140-8560 東京都品川区南大井6-8-2 TEL (03)3763-5611

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List of units for selection

Number	Unit	Number	Unit	Number	Unit	Number	Unit
00	μ	09	tf	18	V	27	ppm
01	mm	10	N	19	mA	28	Tor
02	cm	11	kN	20	A	29	(space)
03	m	12	MN	21	Ω	30	Nm
04	°C	13	kg/mm	22	MΩ	31	###
05	°F	14	kPa	23	Hz	32	kΩ
06	deg	15	MPa	24	G	33	m/S^2
07	gf	16	kgm	25	%	34	kg/cm
08	kgf	17	mV	26	rpm	35	hPa

Types of sensor modes

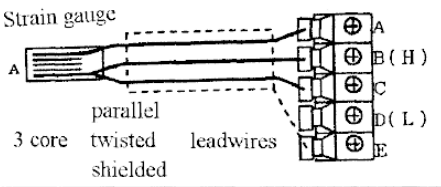
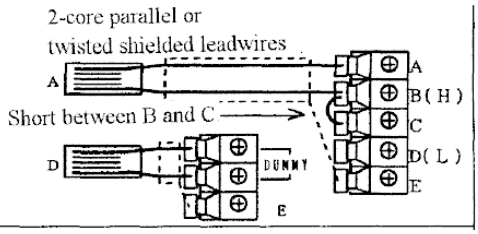
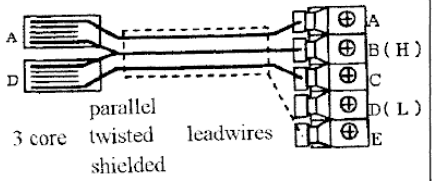
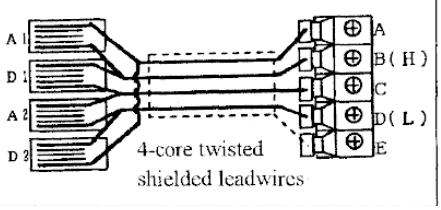
Sensor mode		Sensor No.	Sensor mode		Sensor No.
MANUAL		00	Thermocouple	J (IC)	22
JUMP		01		B	23
Strain	1G60	10		S	24
	1G120	11		R	25
	1G240	12		E (CRC)	26
	1G350	13		N	27
	2G COM	14	Voltage	V (1/1)	30
	2 GAGE	15		V (1/100)	32
	4 GAGE	16	Platinum resist-ance thermometer	Pt 3W	40
	C 350	17		Pt 4W	41
Thermo-couple	T (CC)	20	Strain	4 GAGE 0.1μ	56
	K (CA)	21		C 350 0.1μ	57
	J (IC)	22			

The internal switching box of TDS-303 is not available for Pt 4W.

"Manual" means when it is set from the switch box directly (yellow button "ON")

JUMP means the channel is not used, so not taken measurement on it.

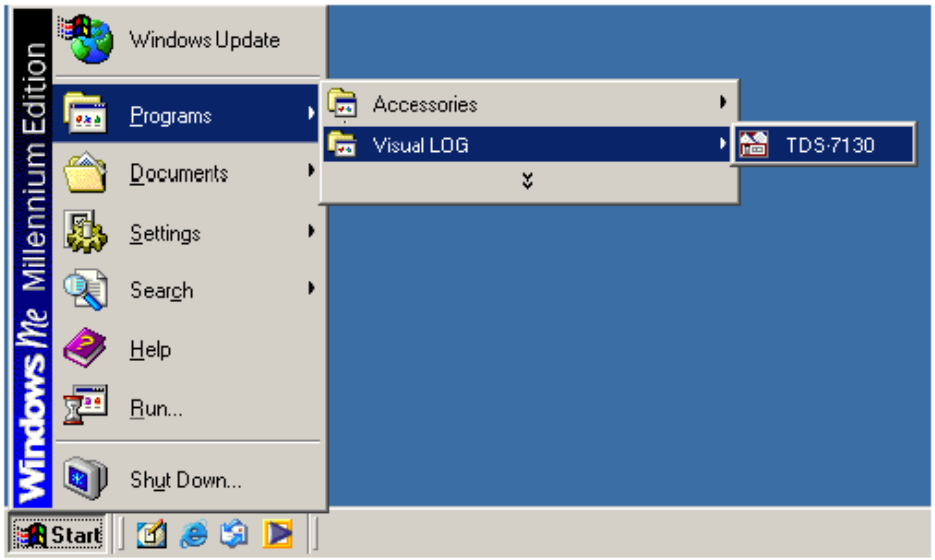
The type is written on the box, and it also depends on how it is connected to the switch box, namely how many wires are there. Most popular type of strain gauge is 1G120 - no 11. Load cells and displacement transducers have no 16 (4 gauge – full bridge).

Measuring method	Applicable sensor mode		Connection diagram
1 gauge 3-wire (1/4 Bridge)	11=1G120 Gauge resistance 120Ω 12=1G240 Gauge resistance 240Ω 13=1G350 Gauge resistance 350Ω A is active gauge. In case of 1 gauge 2-wire method, short B and C terminals.		
2 gauge common dummy (1/2 Bridge)	14=2G COM Gauge resistance 60 - 1000Ω A is active gauge and D is dummy gauge. *The leadwires of A and D gauges should have the same length and go through the same place. *The dummy gauge connected to the internal switching box is effective only for CH. in the box. For the external switching box , prepare for dumm gauges for individual switching boxes.		
2 gauge (1/2 Bridge)	15=2GAGE Gauge resistance 60 - 1000Ω A is active gauge. D is dummy gauge.		
4 gauge (Full Bridge)	16=4GAGE Gauge resistance 60-1000Ω (Note 1)	A1 and A2 are active gauges, and D1 and D2 are dummy gauges.	
4 gauge Constant current (Full Bridge)	17=C 350 Gauge resistance 350Ω		

28. Software setting

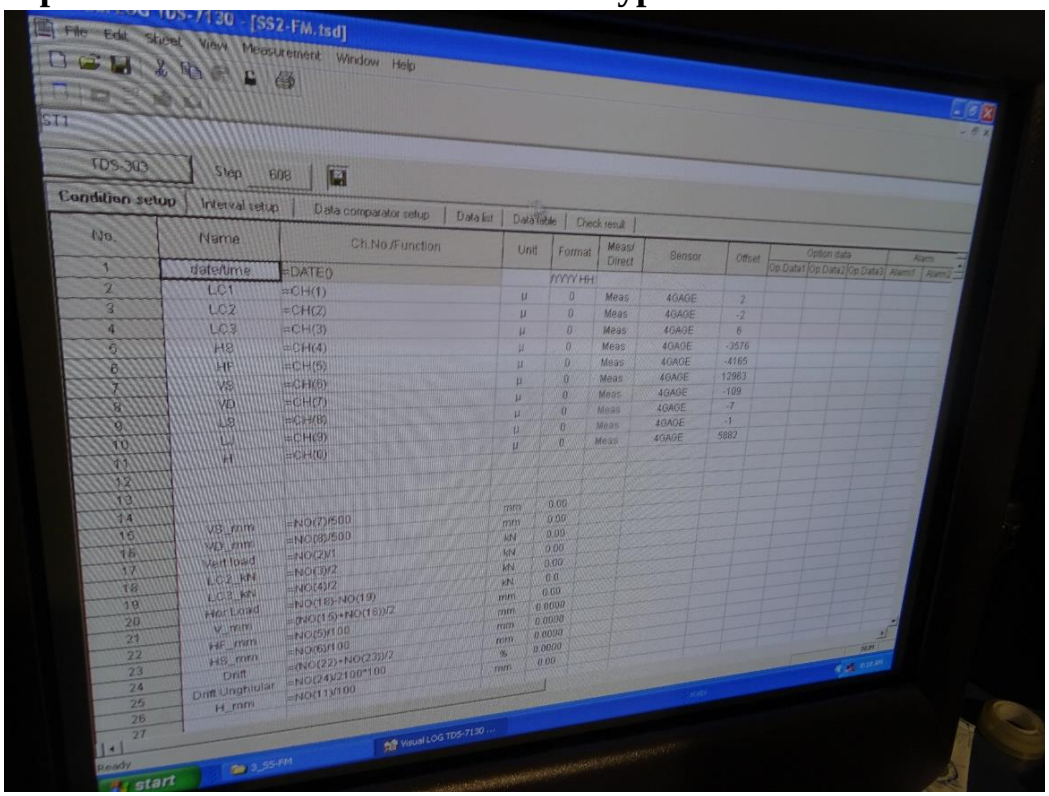
(open an old file, and save as a new one)

Or



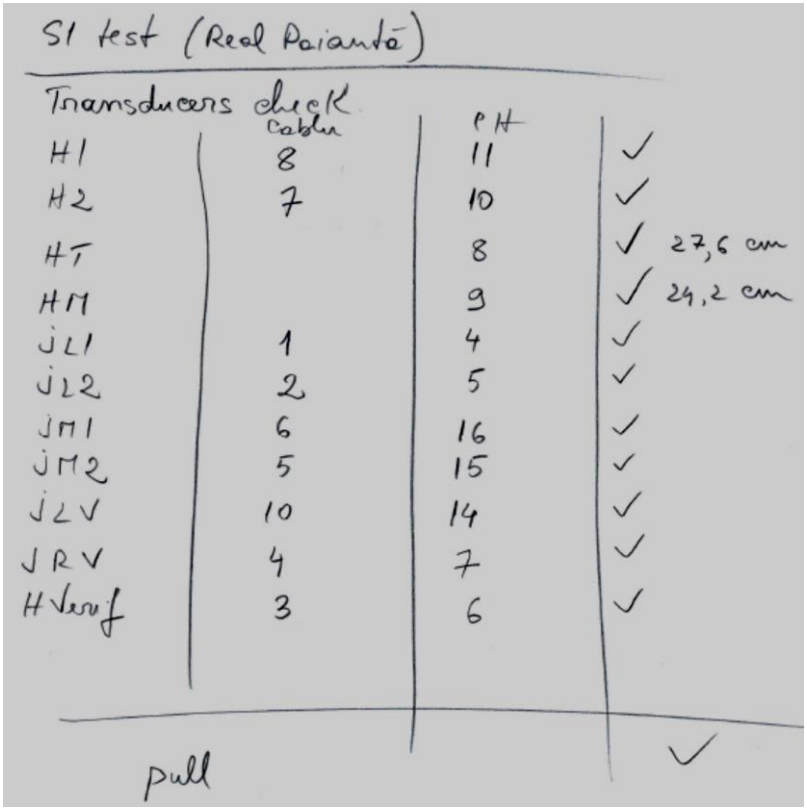
Check the Tutorial (Chapter 5)

29. Input the channels and measurement type and sensor mode



Depending on your need, you can make the formula directly into this file and you can record it with each step of the measurement.

The channels should correspond with the cables:

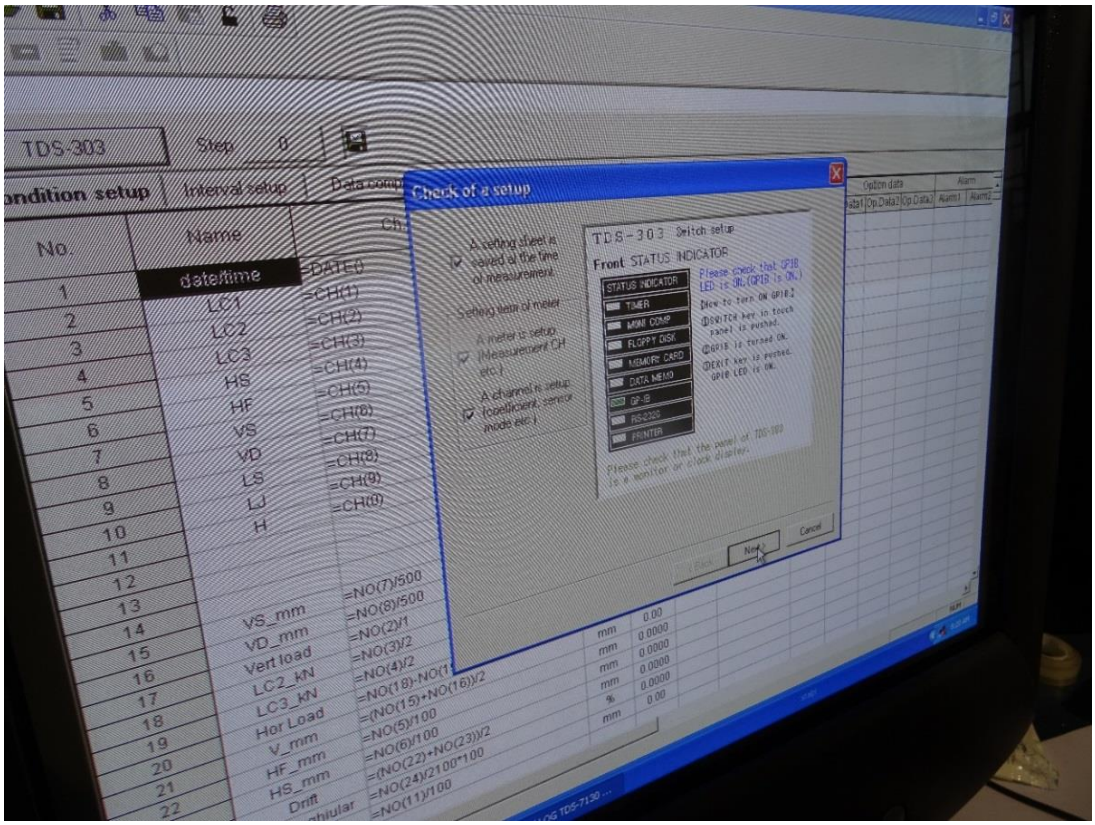


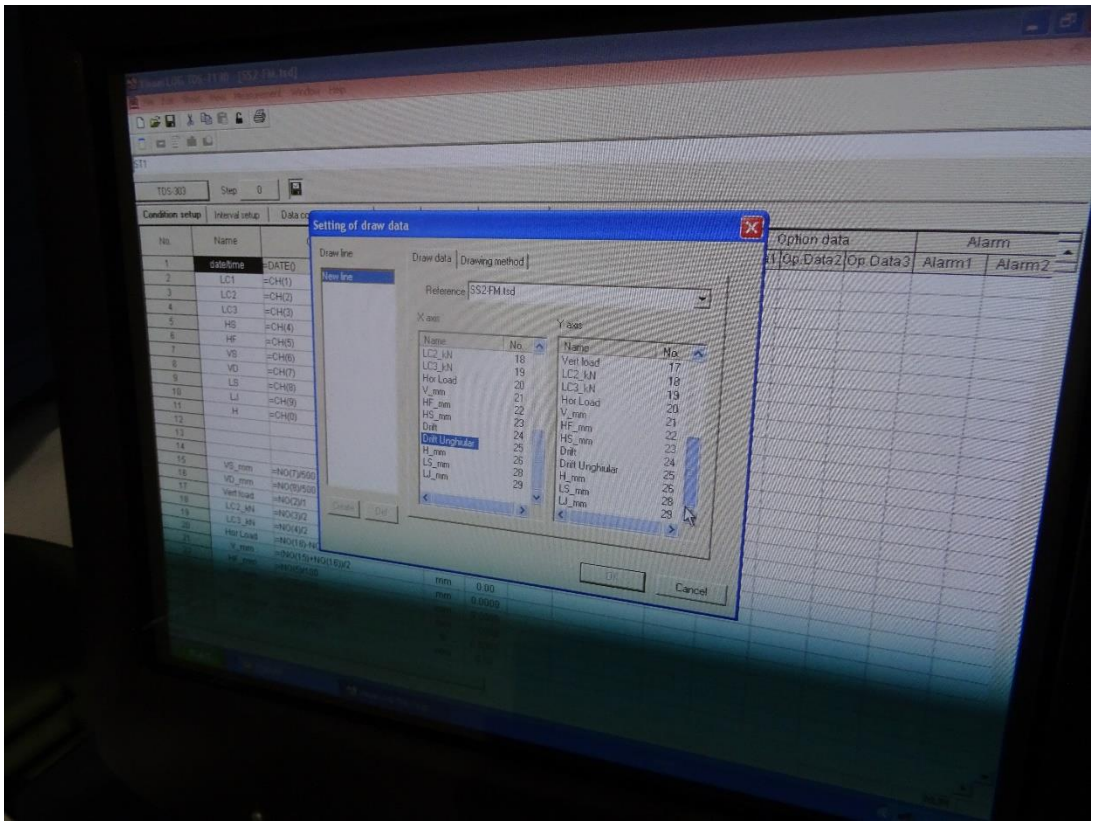
30. In the view menu, go to change of a step to make the start step to 0 (otherwise it will start where you stopped with the previous experiment)

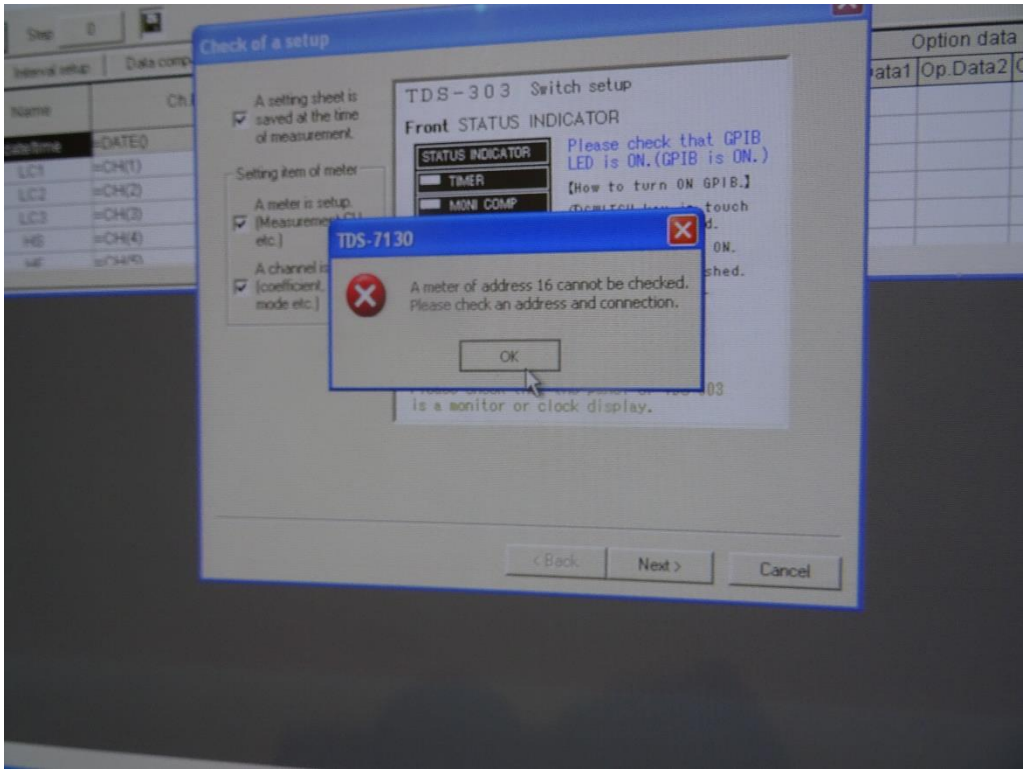
31. Please check if the cylinders are centered. The total stroke of the cylinder is 22.8 cm. If necessary, move the blue beam.

32. Initialize all (measurement menu+Initial In – all input from left towards right side)

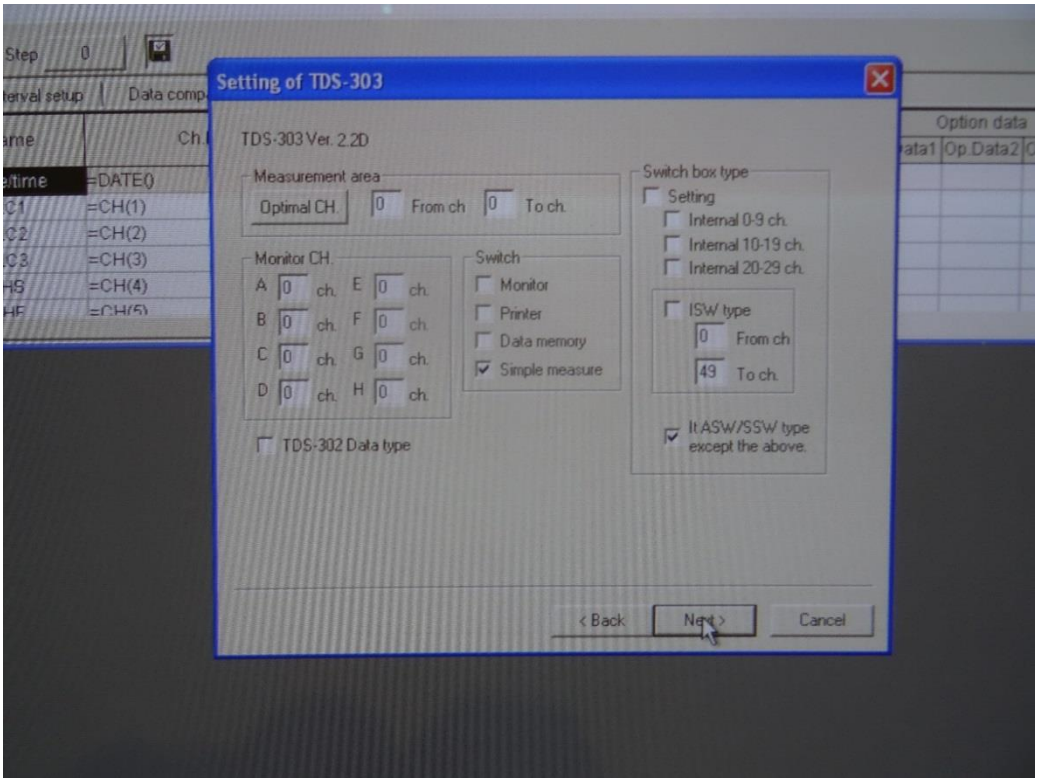
33. Check all the transducers, with a small plate (or glass) of which thickness is known (measured with a device)

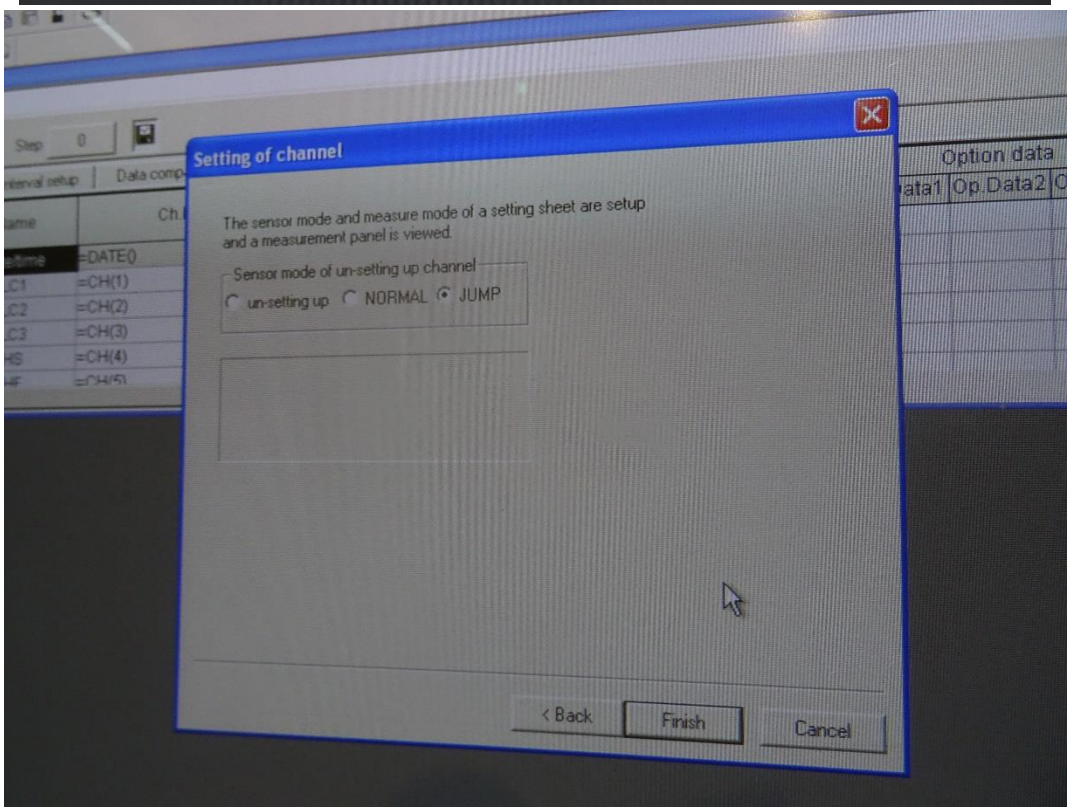



Setting of draw data
Draw line
Draw data
Drawing method
New line
Reference
SS2-FM.tsd
X axis
Y axis
Name
No.
LC2_kN
LC3_kN
Hor.Load
V_mm
HF_mm
HS_mm
Drift
Drift Unighaler
H_mm
LS_mm
LJ_mm
Vert.load
Option data
Op.Data2
Op.Data3
Alarm
Alarm1
Alarm2
OK
Cancel

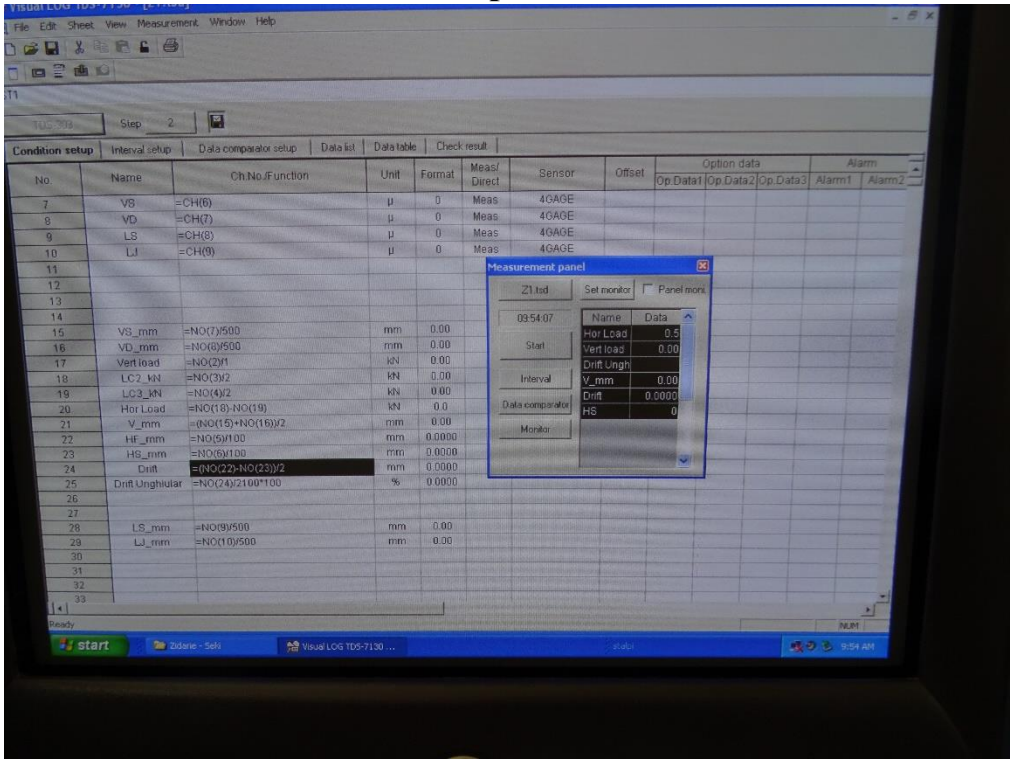

Check of a setup
A setting sheet is saved at the time of measurement.
Setting item of meter
A meter is setup. [Measurement etc.]
A channel is [coefficient, mode etc.]
TDS-303 Switch setup
Front STATUS INDICATOR
STATUS INDICATOR
TIMER
MONI COMP
Please check that GPIB LED is ON.(GPIB is ON.)
[How to turn ON GPIB.]
TDS-7130
A meter of address 16 cannot be checked.
Please check an address and connection.
OK
is a monitor or clock display.
< Back
Next >
Cancel
Option data
Op.Data2

34. Set the measurement panel (CH optimal)



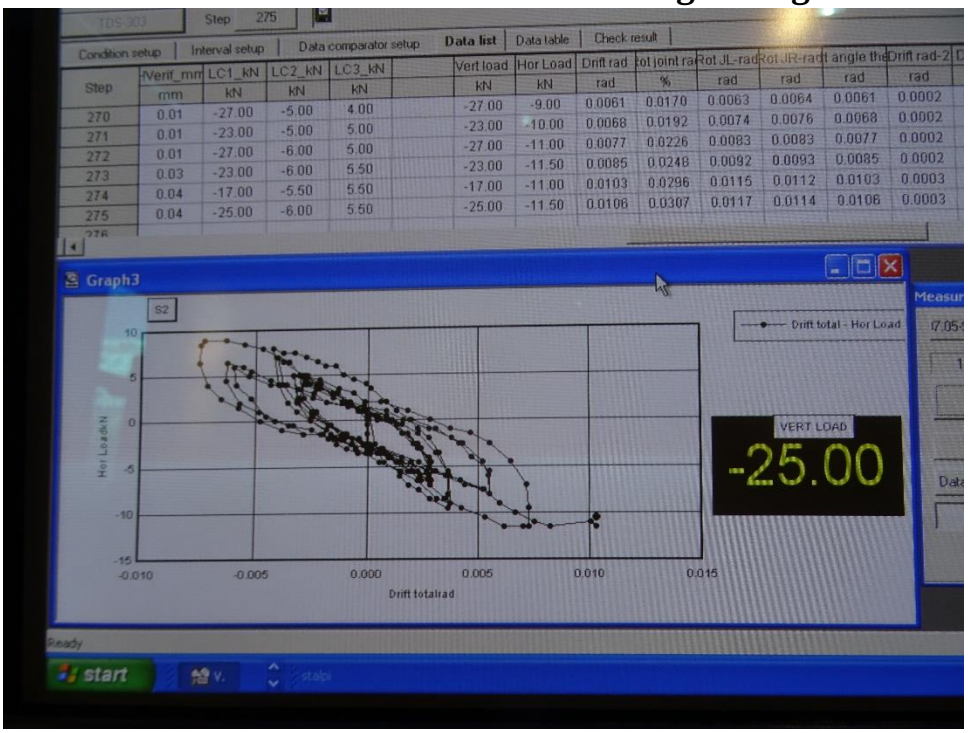


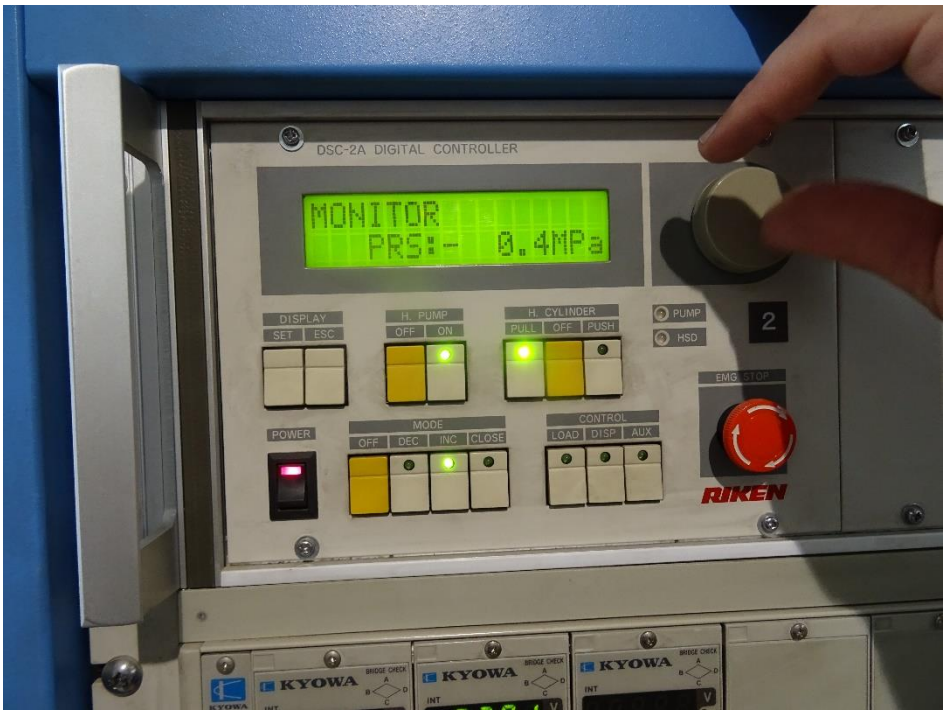
35. To start measure, press „Set Monitor" and set all +scan monitor, then press „Monitor" in the measurement panel

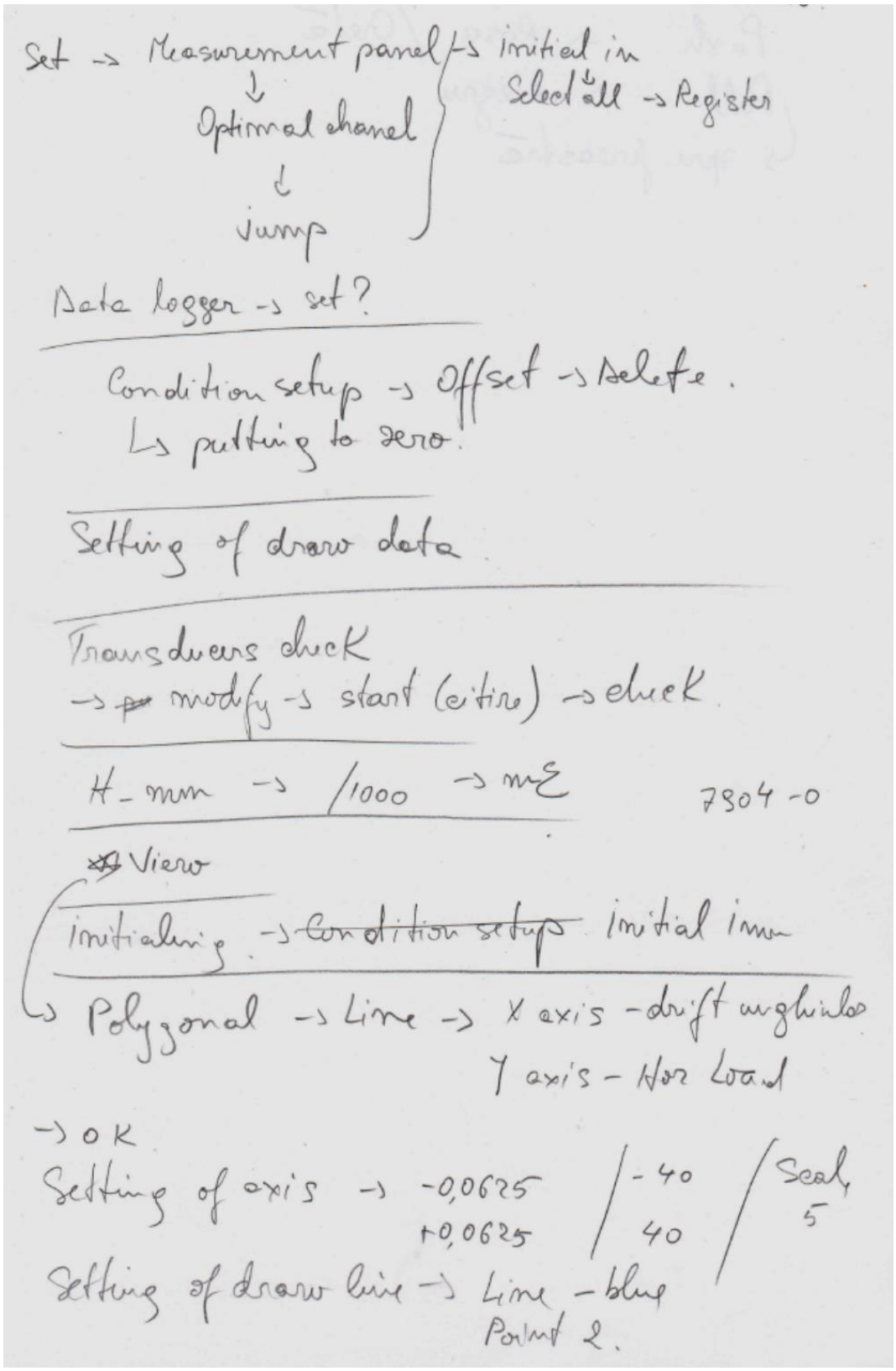


36. In order to make a reading, press „start"

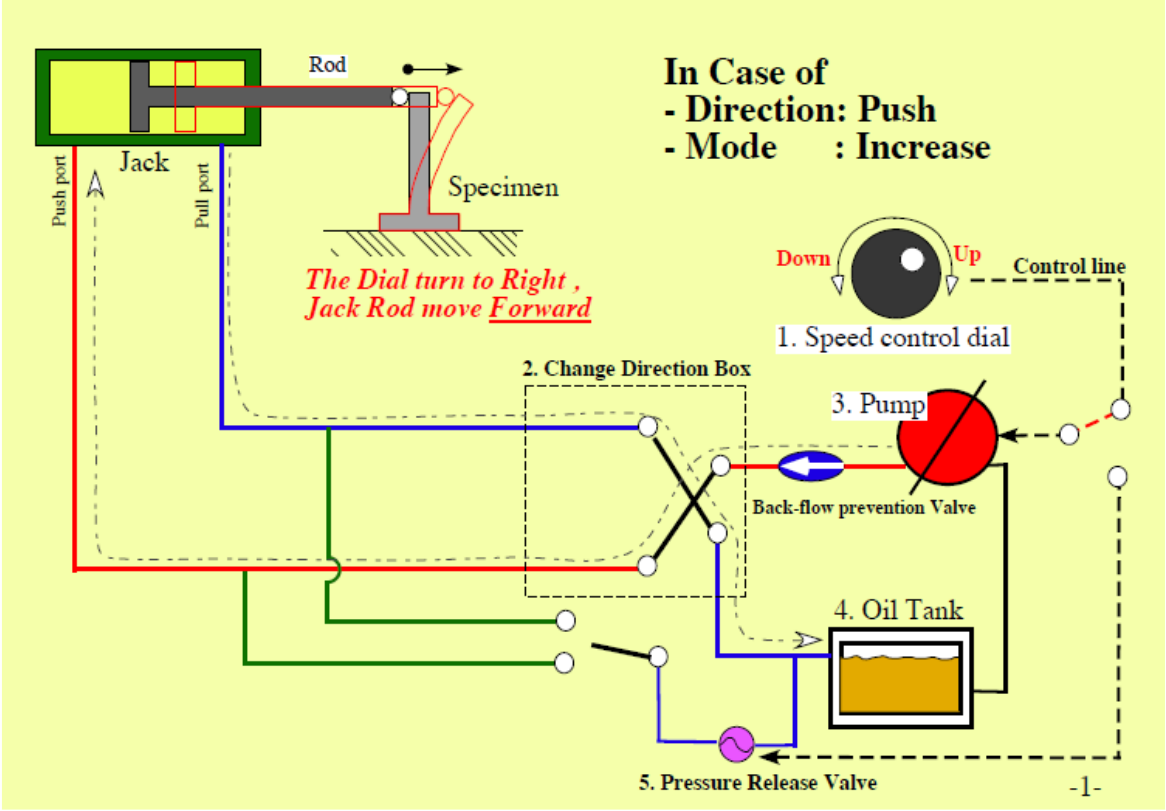
37. Make the graph, and also put the axial load on the right of the graph, with big font so it can be seen and controlled during testing

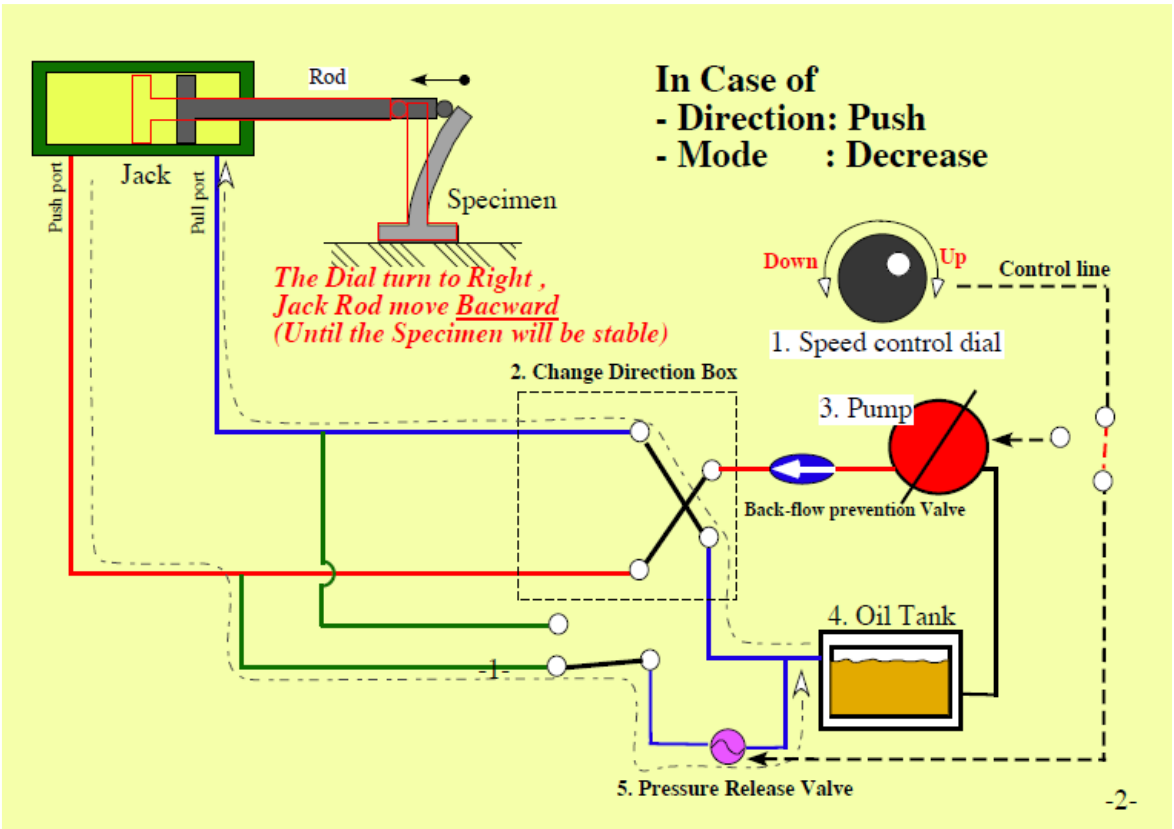


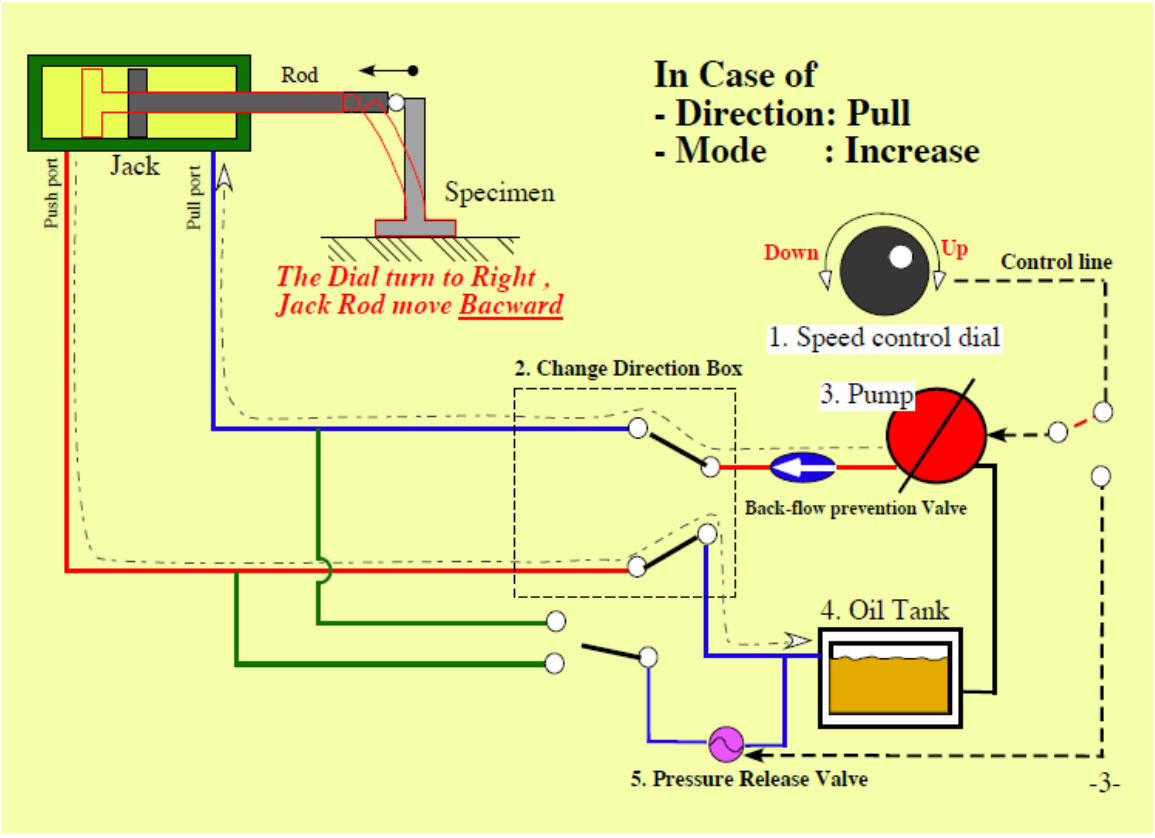

DSC-2A DIGITAL CONTROLLER
MONITOR
PRS:- 0.4MPa
DISPLAY
SET
ESC
H. PUMP
OFF
ON
H. CYLINDER
PULL
OFF
PUSH
PUMP
HSD
2
EMG STOP
POWER
MODE
OFF
DEC
INC
CLOSE
CONTROL
LOAD
DISP
AUX
RIKEN
KYOWA
KYOWA
KYOWA

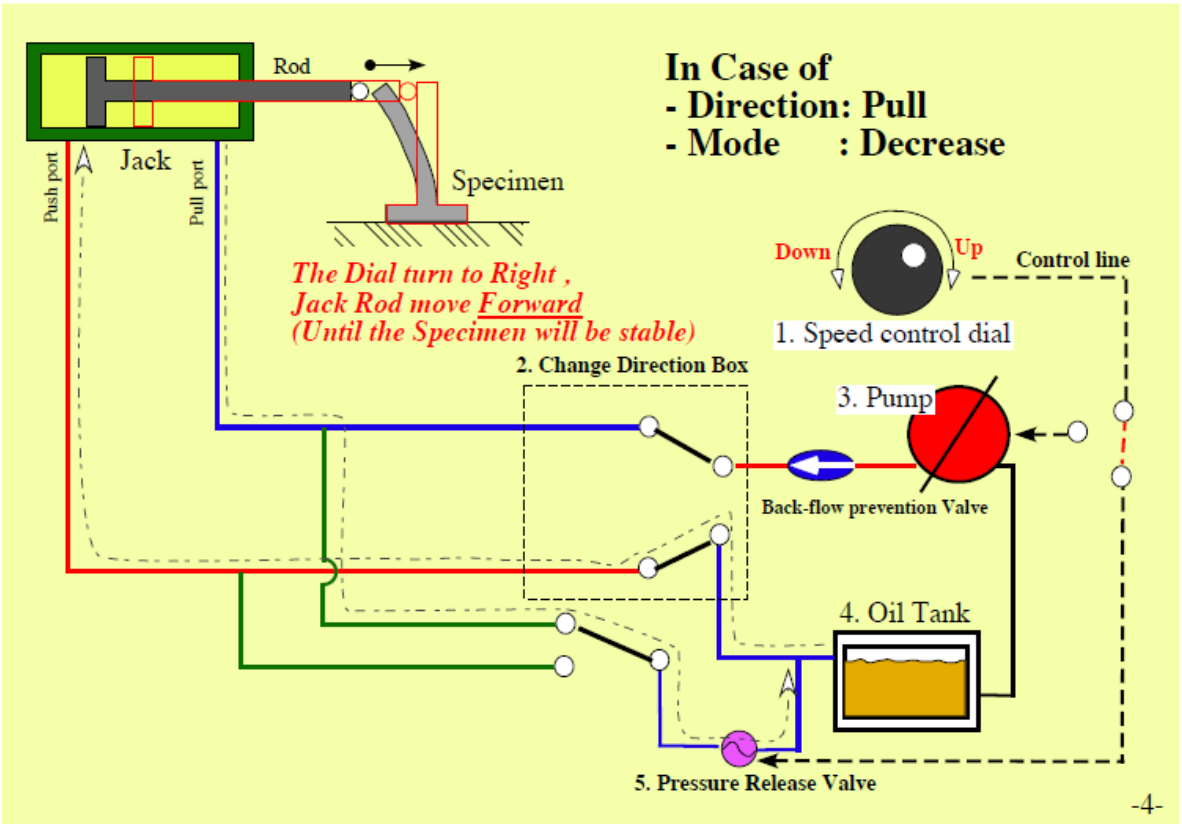

Set -> Measurement panel -> initial in
Optimal channel
Select all -> Register
jump
Data logger -> set?
Condition setup -> Offset -> delete.
-> putting to zero.
Setting of draw data
Transducers check
-> modify -> start (citire) -> check
H_mm -> /1000 -> mE
7804 -0
Viero
initialing -> Condition setup initial imm
-> Polygonal -> Line -> X axis - drift unghiulos
Y axis - Hor Load
-> OK
Setting of axis -> -0,0625 / -40 / Scale
+0,0625 / 40 / 5
Setting of draw line -> Line - blue
Point 2.

38. Principle of actuator






Rod
Jack
Push port
Pull port
Specimen
The Dial turn to Right ,
Jack Rod move Bacward
In Case of
- Direction: Pull
- Mode : Increase
Down
Up
Control line
1. Speed control dial
2. Change Direction Box
3. Pump
Back-flow prevention Valve
4. Oil Tank
5. Pressure Release Valve
-3-


Rod
Jack
Push port
Pull port
Specimen
The Dial turn to Right ,
Jack Rod move Forward
(Until the Specimen will be stable)
In Case of
- Direction: Pull
- Mode : Decrease
Down
Up
Control line
1. Speed control dial
2. Change Direction Box
3. Pump
Back-flow prevention Valve
4. Oil Tank
5. Pressure Release Valve
-4-

39. Insert the metal plates above every column, to input on them the axial force (not uniformly distributed). Check the level, if thicker metal plates are needed on different colums, so the blue loading beam would sit on all the columns equally

40. Lower the beam as close as possible to the metal plates sitting on the columns

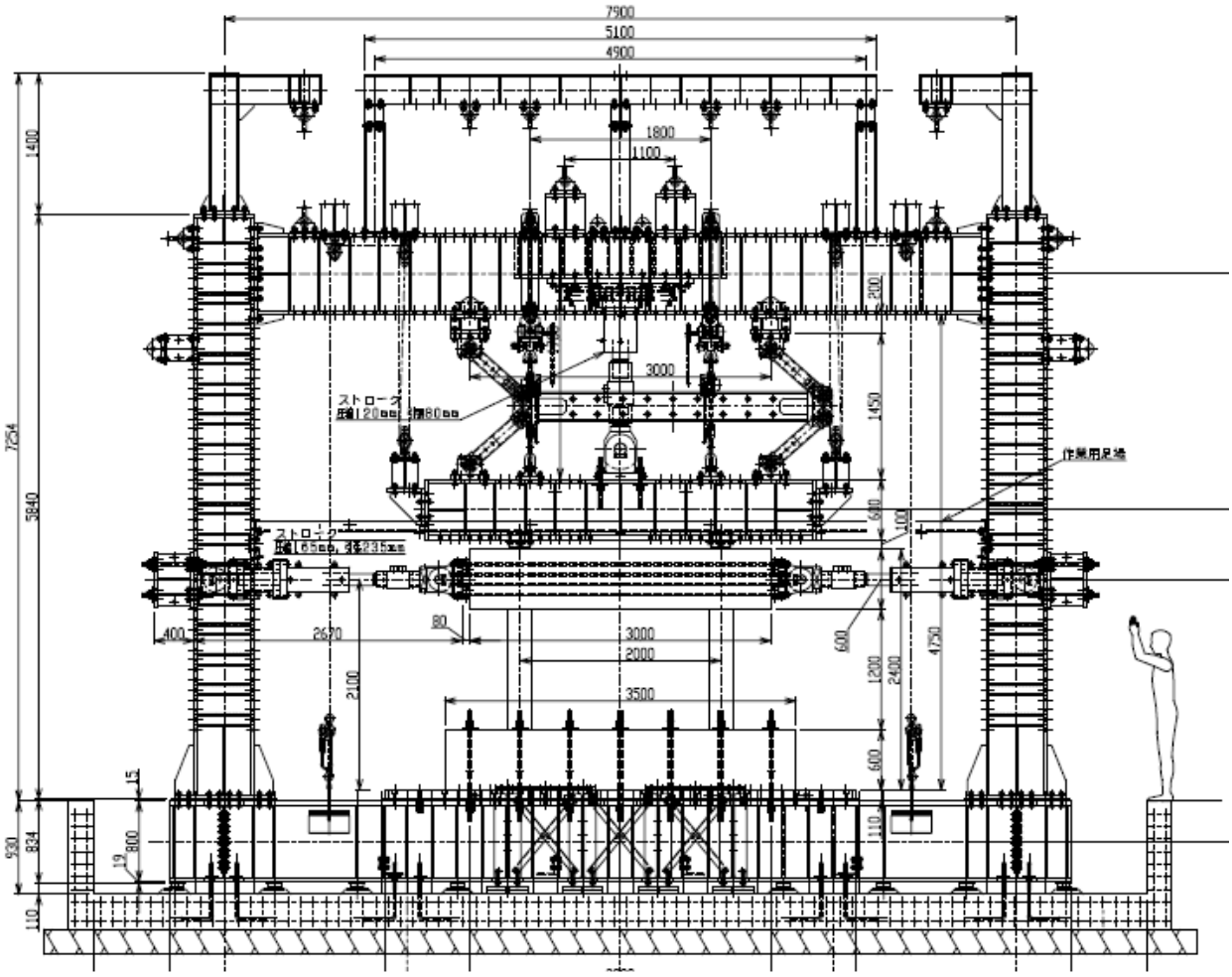
41. The wire transducer for the top displacement is connected last, after the vertical force is applied

42. Initial In all

43. Axial force

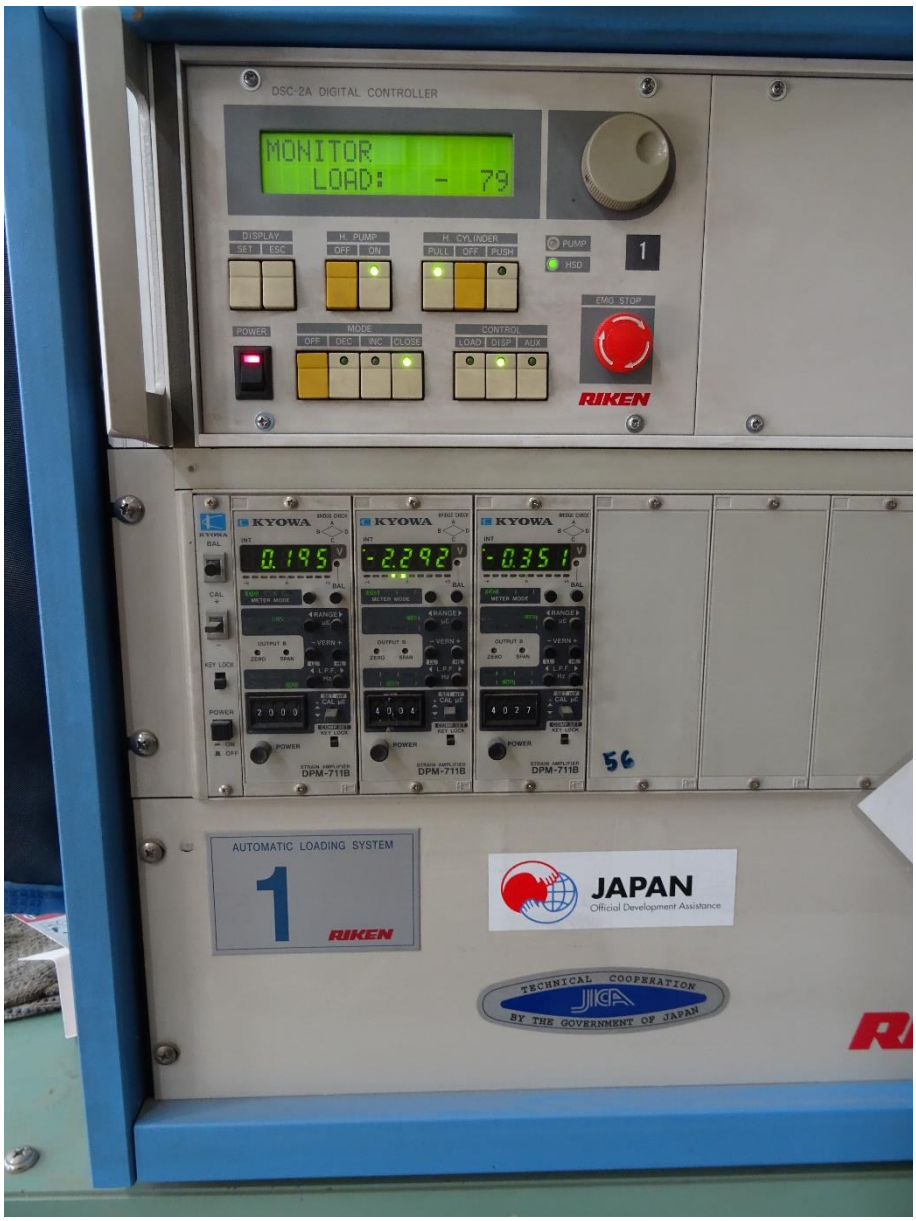
There are 2 ways to apply axial force (in both situations, we have to consider that the pantograph weights 57 kN).

1. By counter weight – it means no axial force control, just mechanical. Add all 4 package of counterweights. Setup is like this:



2. Axial force control:

- **Pump ON, H.Cylinder PULL, Mode INC**, rotate the wheel to the right side slowly (to increase the speed)
- When the force (shown in the software) reaches 57 kN (or 60kN) and stabilizes, it means the cylinder is holding the entire weight of the blue beam so you can push: **Mode CLOSE+Control DISP**

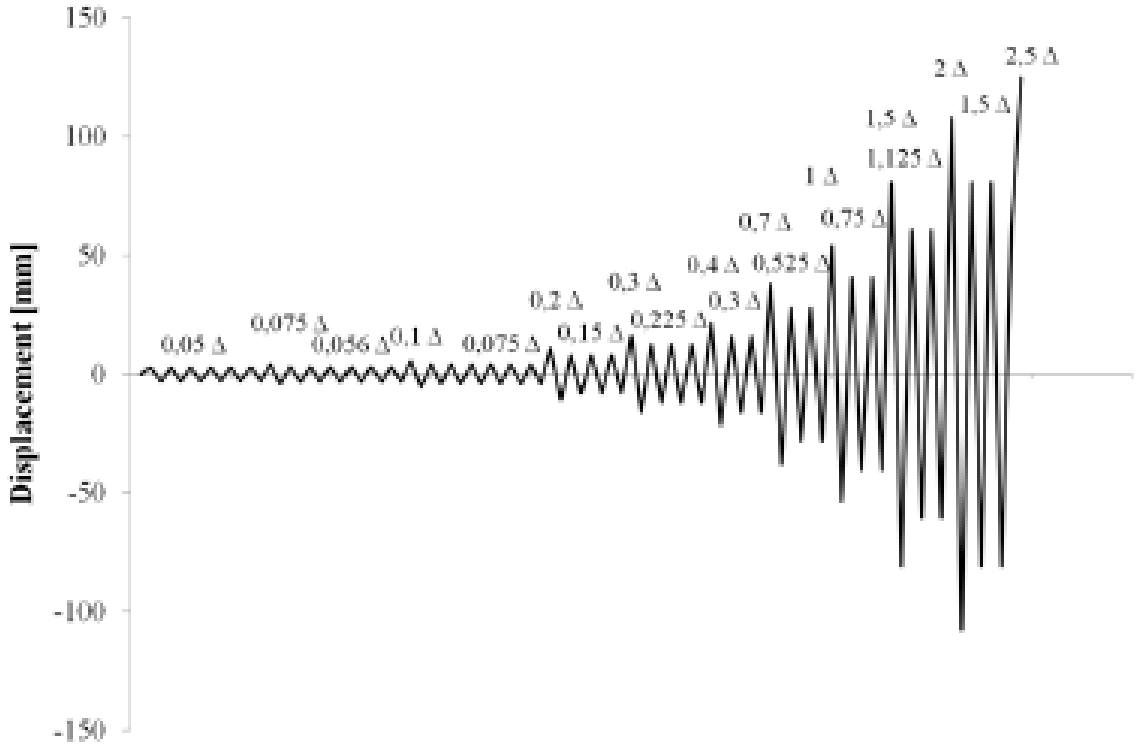


- Release the pulleys (5 tons each) enough so the beam can go up/down at least 5 cm. Do not release it completely (from the eye-nut, so it can be a safety system);
- **Make an Initial In for all the channels, and 57 kN weight of the beam becomes 0.**
- Then **Pump ON, H.Cylinder PULL** (they are already ON, do not change them), Mode DEC and rotate the wheel slowly while observing the Vertical force value, until it reaches the Axial force value established for the test (for example 26 kN);
- Then **Pump ON, H.Cylinder PULL, Mode CLOSE+Control LOAD**.

- During the testing, with high amplitudes of the displacement, the vertical load will decrease or increase, and it must be kept as constant as possible. For this reason, a person should control this pump and push **Mode DEC** when vertical force is decreasing more than 10% of the initial value, then fix it again with **Mode CLOSE+Control LOAD** and **Mode INC** when the vertical force is increasing more than 10% of the initial value, then fix it again with **Mode CLOSE+Control LOAD**.

44. Fix the specimen at the upper part with bolts to the blue loading beam. Please check verticality

45. Loading protocol CUREE – Caltech



Consider Δ based on previous tests (Portugal, Japan), 80 mm.

46. Horizontal loading

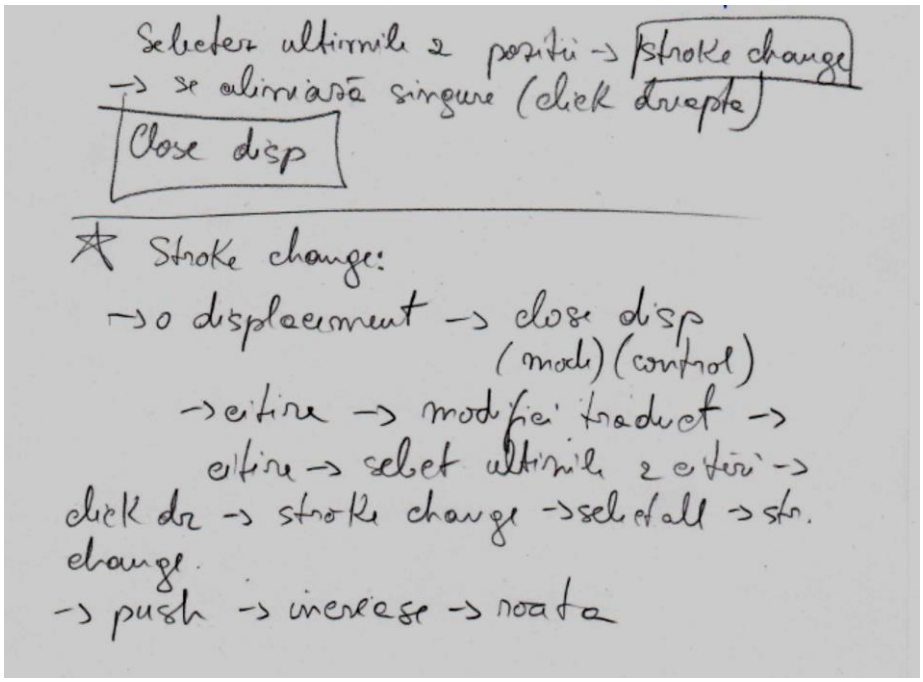
For the horizontal loading the procedure is similar to the vertical loading.
The zero point should be in the center of the two cylinders, so at the end we can have equal stroke for each sides.

Push is towards the right of the reaction frame and pull is towards the door (left of the reaction frame).
For a cycle with target displacement +5 mm:

- **Pump ON, H.Cylinder PUSH, Mode INC**, rotate the wheel to the right side slowly (to increase the speed – the speed should not be high for small amplitudes of displacement)
- When reaching the positive PEAK (+ 5mm), rotate the wheel to the left until you hear no more the pump) and it should stay there without movement.
- After taking photos and analyzing the specimen, **Pump ON, H.Cylinder PUSH, Mode DEC** – until you hear no more the pump;
- **Pump ON, H.Cylinder PULL, Mode INC**, rotate the wheel to the right side slowly (to increase the speed – the speed should not be high for small amplitudes of displacement)
- Be careful to stop in 0 displacement and take a photo
- When reaching the negative PEAK (- 5mm), rotate the wheel to the left until you hear no more the pump) and it should stay there without movement.
- After taking photos and analyzing the specimen, **Pump ON, H.Cylinder PULL, Mode DEC** – until you hear no more the pump;
- **Pump ON, H.Cylinder PUSH, Mode INC**, rotate the wheel to the right side slowly (to increase the speed – the speed should not be high for small amplitudes of displacement)
- Be careful to stop in 0 displacement and take a photo

47. Stroke change (morikae)

If one of the transducers run out of stroke, it is possible to increase it (by changing its position) and not affect the results



48. Unloading to finish the test (vertical cylinder)

- Take the specimen to 0 displacement.
- Horizontal force is **Pump ON, H.Cylinder PUSH, Mode INC** (if I come back from the negative cycle – from the left side)
- Release the upper bolts with which the specimen is fixed to the loading blue beam
- Be careful to have the belts fixed on the specimen, in two of the pulleys above the blue beam
- Horizontal force is **Pump ON, H.Cylinder PULL, Mode INC**, rotate the wheel to the right side slowly (to increase the speed – the speed should not be high so you can stop quickly)
- At 0 kN you can rotate the wheel to the left side until you hear no more the pump
- Tension the pulleys (5 tons each) until you see on the screen of the computer -57 kN (or until it stabilizes)
- **Mode OFF**
- Check that the pressure is 0 (or close to 0).
- **Pump OFF**

49. Unloading to finish the test (horizontal cylinder)

- Take the specimen to 0 displacement.
- Horizontal force is **Pump ON, H.Cylinder PUSH, Mode INC** (if I come back from the negative cycle – from the left side)
- After the release of the upper part of the specimen to the loading blue beam, force should be 0 (or around 0 kN)
- Check that the pressure is 0 (or close to 0).
- **Mode OFF, H.Cylinder OFF, Pump OFF**