SiameseAux

August 10, 2023

```
[2]: """Delete ths cell when done!"""
     %load_ext autoreload
     %autoreload complete
```

```
[3]: import numpy as np
     import torch
     device = torch.device("cuda" if torch.cuda.is_available() else "cpu")
     s = {
         'problem'            : "regression",
         'approach'           : "metric learning/non-parametric",
         'algorithm'          : "triplet network",
         'input'              : "samples from a distribution",
         'input type'         : "vectors",
         'input meaning'      : "spectrum",
         'output'             : "samples from a distribution",
         'output type'        : "one number",
         'output meaning'     : "temperature or pressure, depending on distribution",
         'learning rate'      : 1e-4,
         'input dimension'    : 10000,
         'output dimension'   : 1,
         'feature dimension'  : 300,
         'epoch'              : 1000,
         'epoch-development'  : 1,
         'cross validation round': 16,
         'cross validation round-development' : 1,
         'batch size'         : 64,
         'best model folder'  : 'triplet_best_model/'
     }
     # https://arxiv.org/pdf/1412.6622.pdf
     import data_accessor as acc
     datas = [
         'pressure_230516_discrete',
         'temperature_230509_discrete'
         ]
     data_dictionary = acc.setup(datas)
```

```
loading pressure_230516_discrete_____
        input shape (number, dimension): (5000, 10000)
```

```
        label shape (number, dimension): (5000, 1)
        there are 16 folds
        3500 for training, 500 for validating, 1000 for testing
loading temperature_230509_discrete_____
        input shape (number, dimension): (6000, 10000)
        label shape (number, dimension): (6000, 1)
        there are 16 folds
        4200 for training, 600 for validating, 1200 for testing
```

```python
from CrossValidation import CrossValidator
from tools import SaveBestCrossValidationModel
from Siamese import SiameseDataset, SiameseAuxManager
from data import alternate_rows_itertools
datas.reverse()
CVtor = CrossValidator(s['cross validation round'],
                       s['epoch'],
                       SaveBestCrossValidationModel(s['best model folder']),
                       SiameseDataset,
                       datas,
                       data_dictionary,
                       SiameseAuxManager,
                       s,
                       device)
# CVtor.single_task_train(0)
CVtor.multi_task_train_sequential()
# CVtor.multi_task_train_weave(alternate_rows_itertools)
CVtor.complete_notify()
CVtor.test_all()
```

```
_____CROSS VALIDATION_____
Cross-validation rounds: 16
Epochs: 1000
Datas to learn:
        0: temperature_230509_discrete
        1: pressure_230516_discrete
MULTI TASK, Sequential_____
we're learning: multiple tasks
given [1, 2, 3], [a, b, c]: learn [1, 2, 3], reset model, learn [a, b, c]
CV round 0_____
using: 0 temperature_230509_discrete
EARLY STOPPING @ epoch 23
min train loss: 0.00012060180685666361
min valid loss: 0.00011525286026881076
```
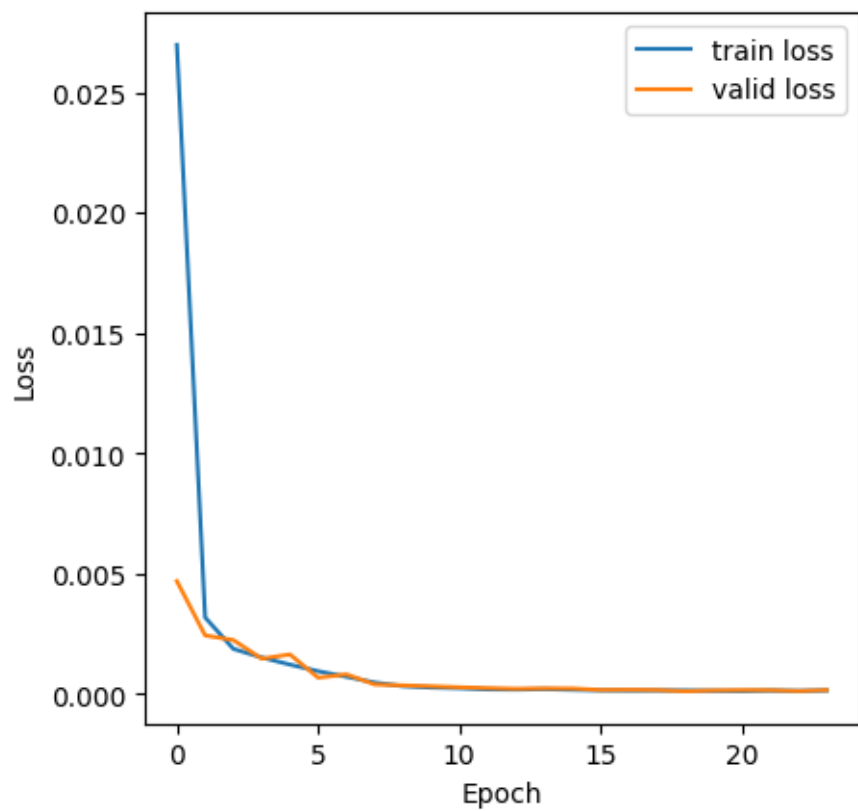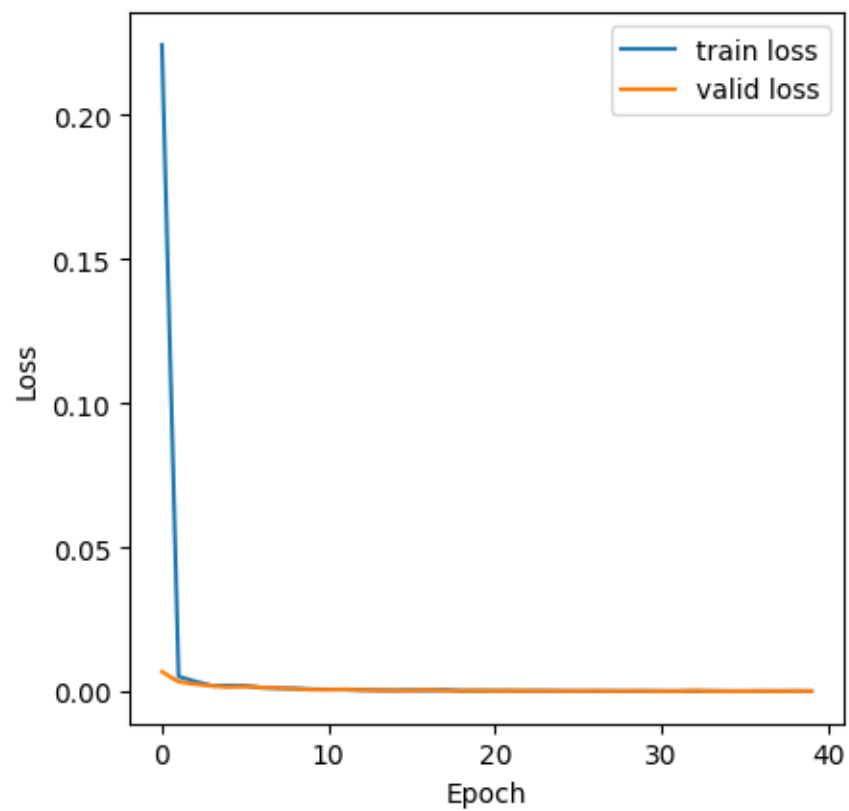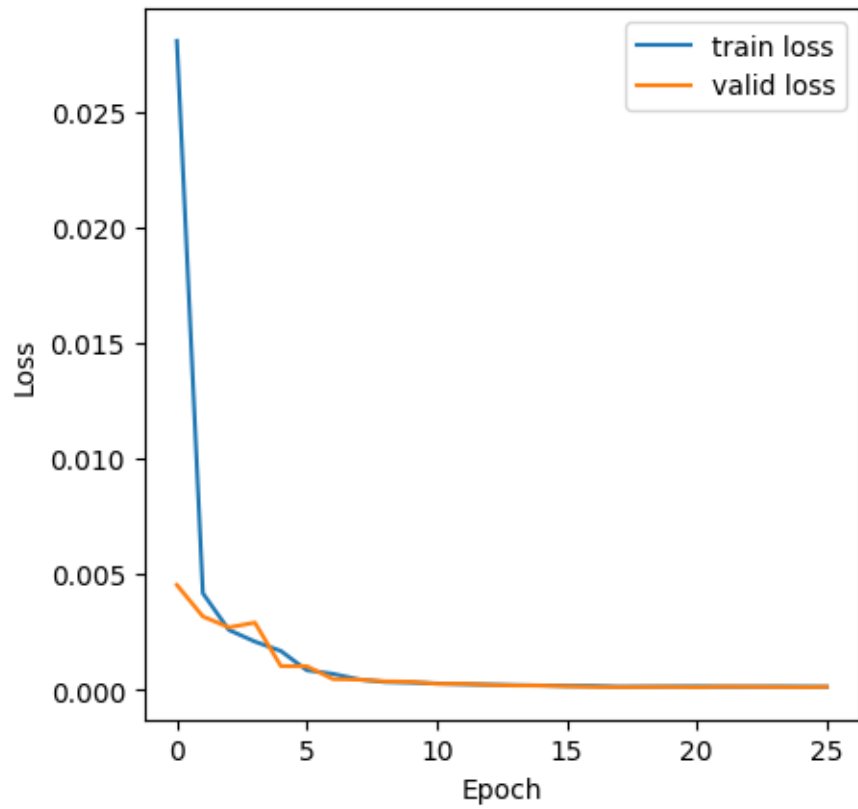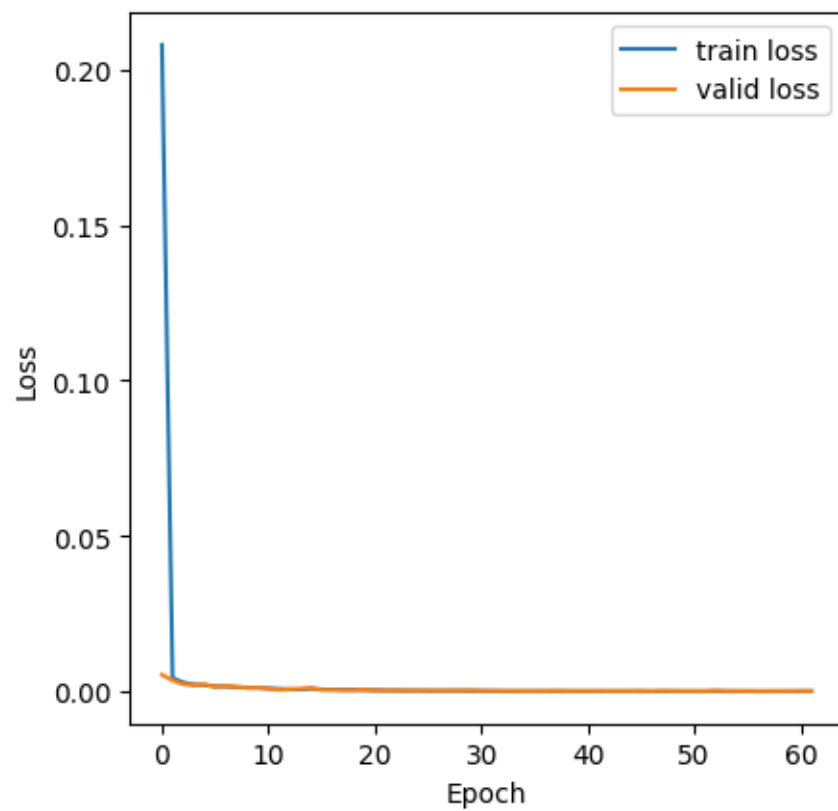
```
using: 1 pressure_230516_discrete
EARLY STOPPING @ epoch 39
min train loss: 0.00010452378370576877
min valid loss: 0.00011355188144079875
```
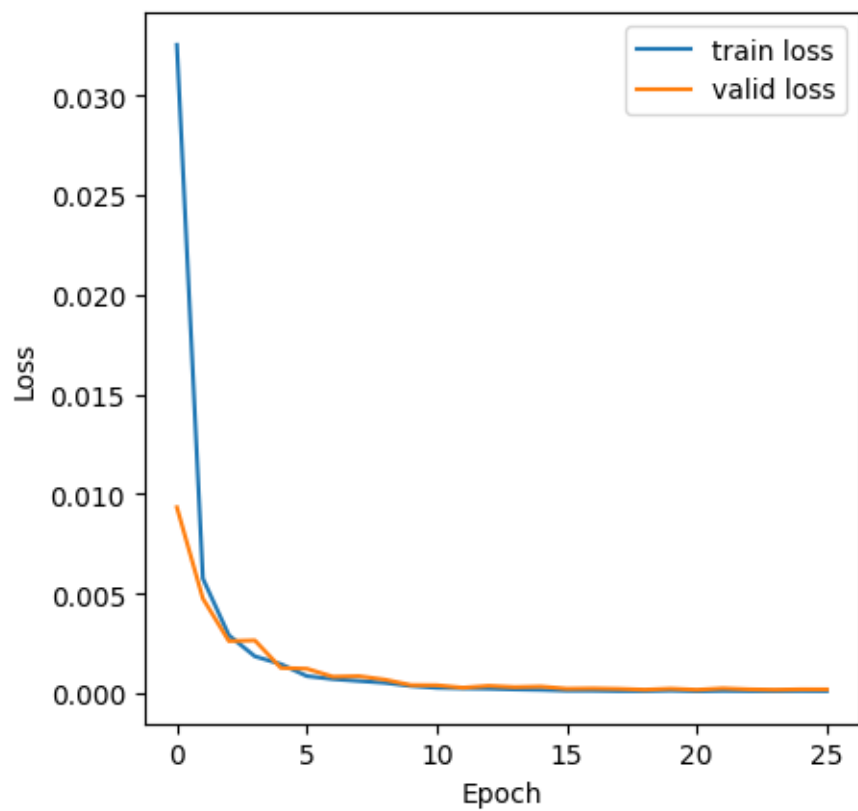
```
CV round 1_____
using: 0 temperature_230509_discrete
EARLY STOPPING @ epoch 25
min train loss: 0.00012248618700003576
min valid loss: 0.00010324584145564586
```
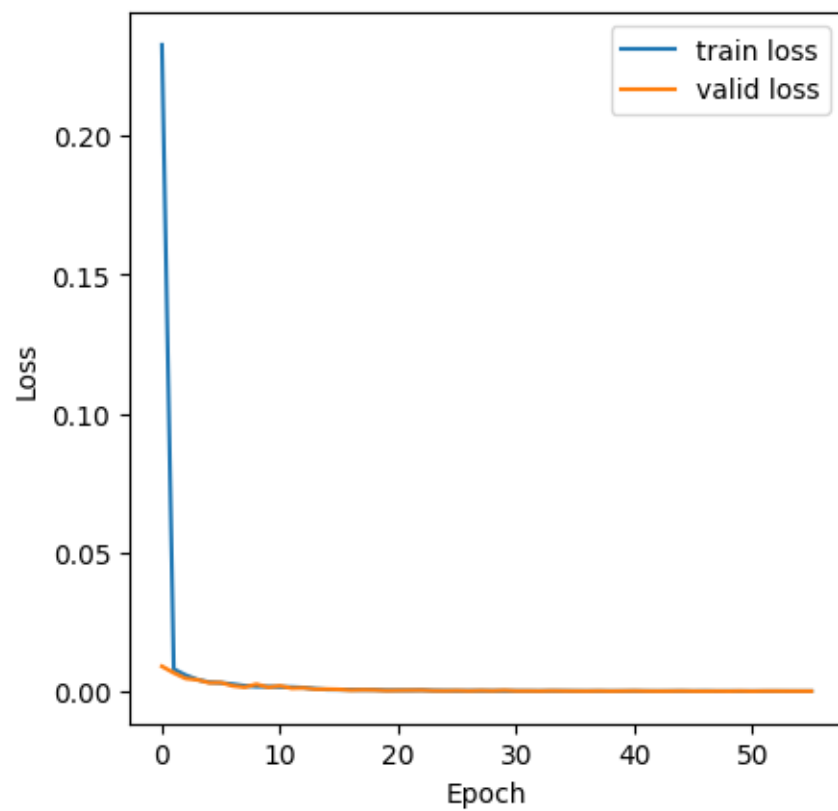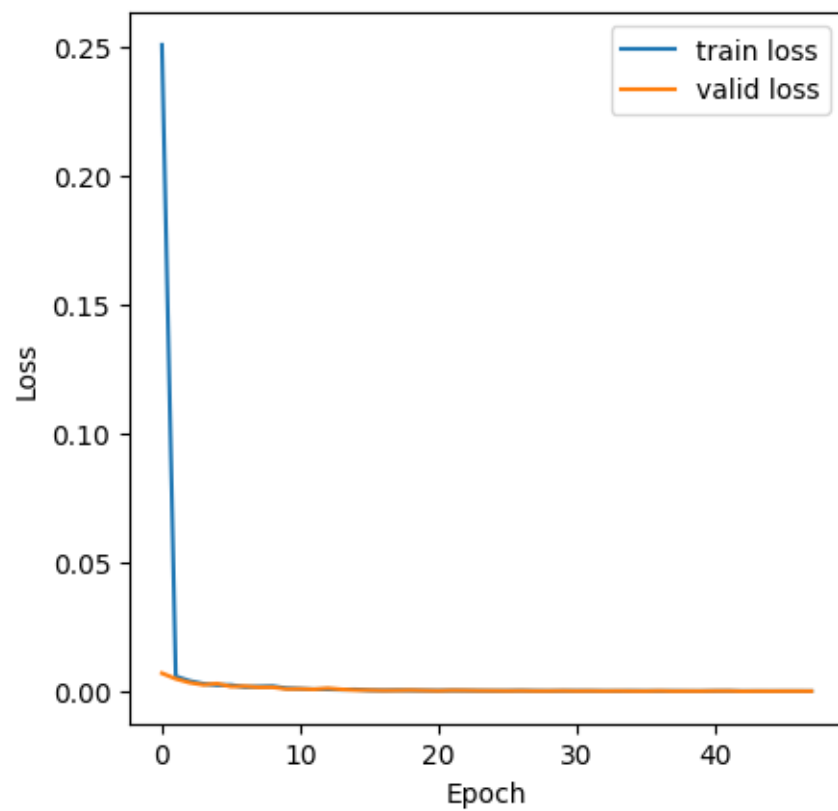
```
using: 1 pressure_230516_discrete
EARLY STOPPING @ epoch 61
min train loss: 6.942004917866804e-05
min valid loss: 7.391131657641381e-05
```

```
CV round 2_____
using: 0 temperature_230509_discrete
EARLY STOPPING @ epoch 25
min train loss: 0.00010547128697384544
min valid loss: 0.00017664216939010656
```

```
using: 1 pressure_230516_discrete
EARLY STOPPING @ epoch 55
min train loss: 7.095646486215463e-05
min valid loss: 6.638699960603844e-05
```

```
CV round 3_____
using: 0 temperature_230509_discrete
EARLY STOPPING @ epoch 21
min train loss: 0.00011995823346792763
min valid loss: 0.00023110889014787972
```
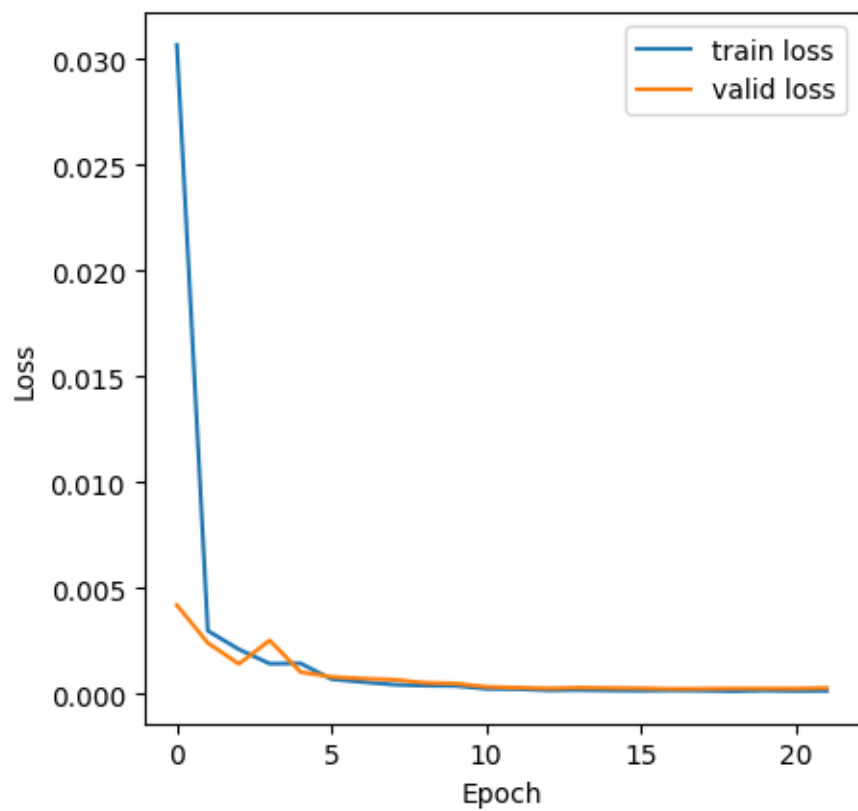
```
using: 1 pressure_230516_discrete
EARLY STOPPING @ epoch 47
min train loss: 8.265579487091269e-05
min valid loss: 6.895865590195172e-05
```

```
CV round 4_____
using: 0 temperature_230509_discrete
EARLY STOPPING @ epoch 34
min train loss: 0.00011980975162287271
min valid loss: 8.445033527095802e-05
```
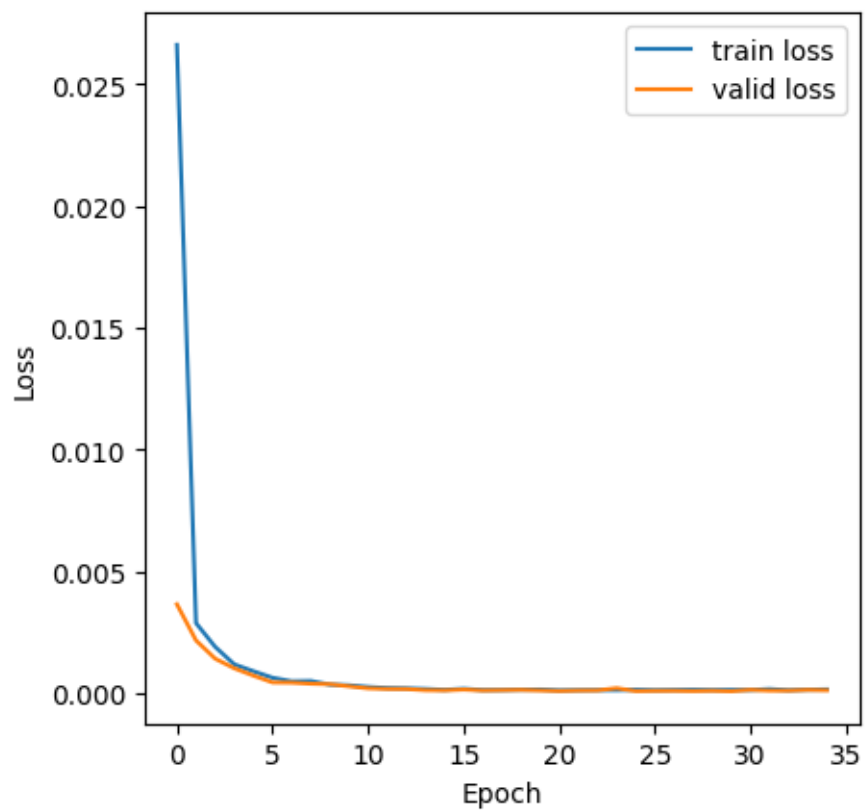
```
using: 1 pressure_230516_discrete
EARLY STOPPING @ epoch 21
min train loss: 0.00032055149177763966
min valid loss: 0.00035470783768687397
```
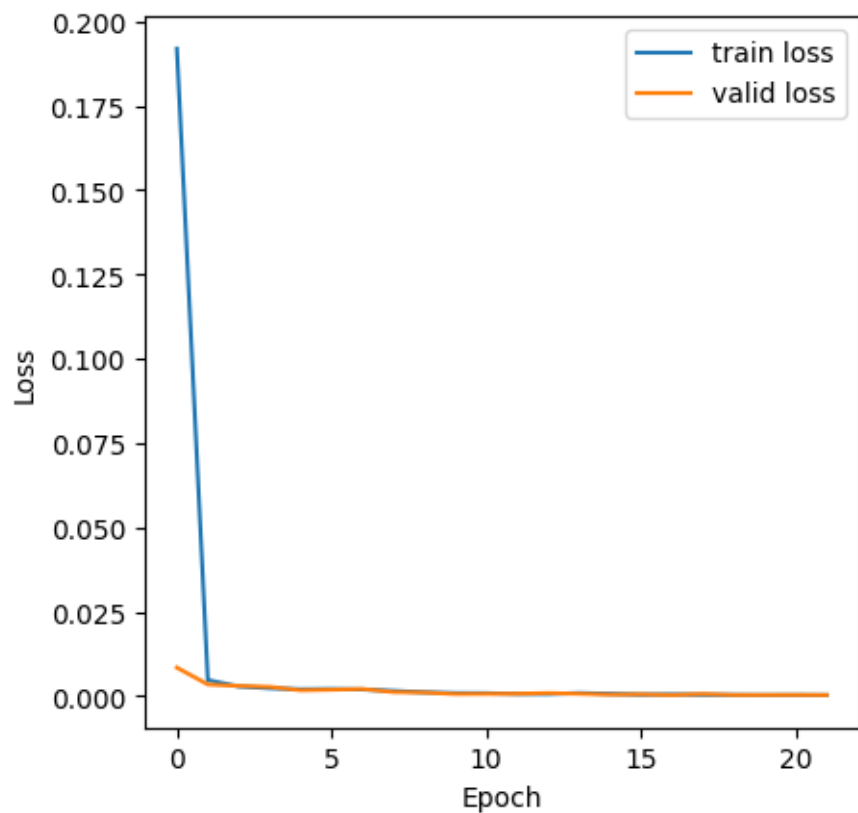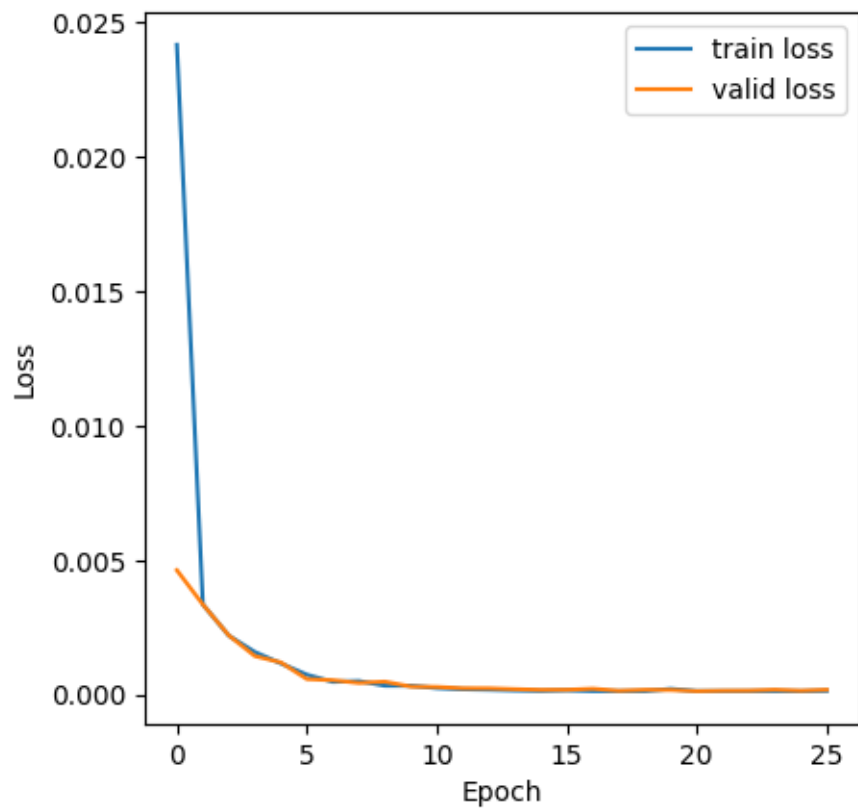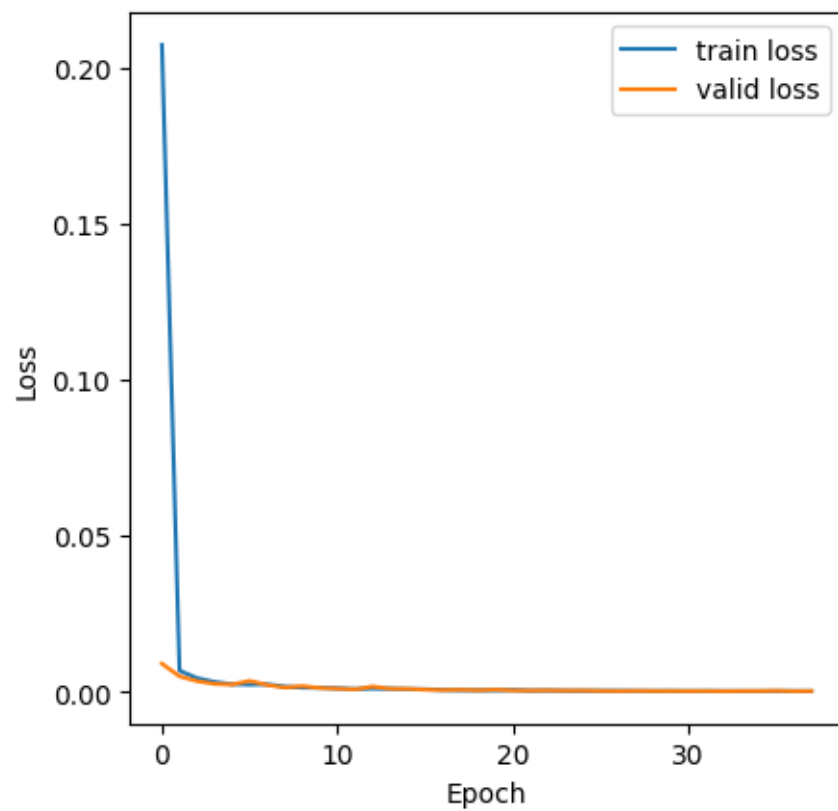
```
CV round 5_____
using: 0 temperature_230509_discrete
EARLY STOPPING @ epoch 25
min train loss: 0.00012061751796423006
min valid loss: 0.0001080228466889821
```
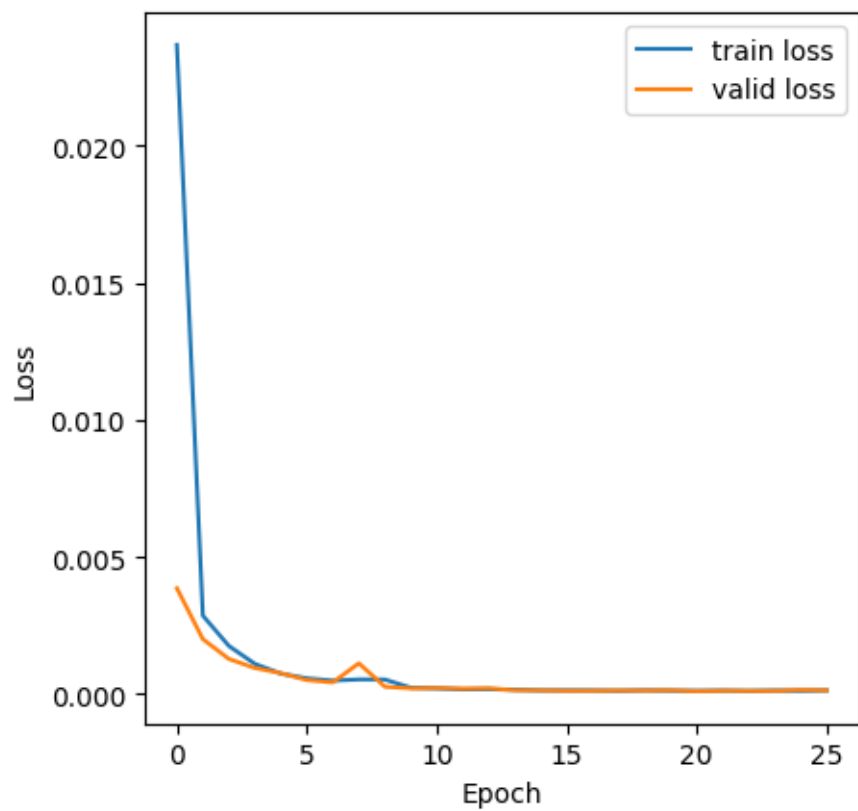
using: 1 pressure_230516_discrete
EARLY STOPPING @ epoch 30
min train loss: 0.0001841682628516785
min valid loss: 0.00016646336916892324
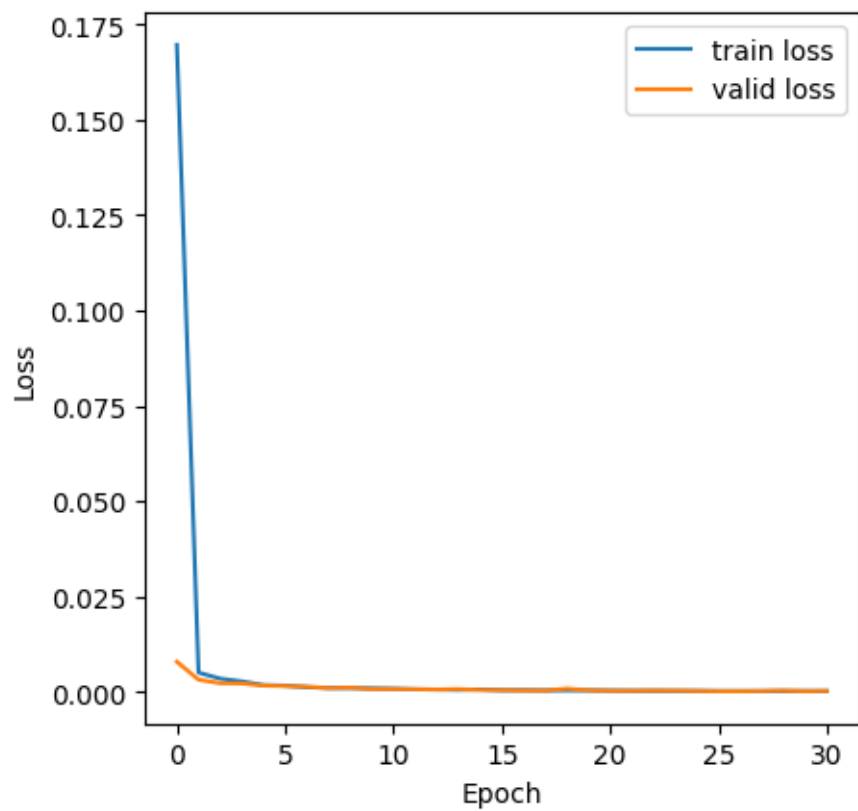
```
CV round 6_____
using: 0 temperature_230509_discrete
EARLY STOPPING @ epoch 25
min train loss: 0.00012193696723746446
min valid loss: 0.00012471754162106662
```
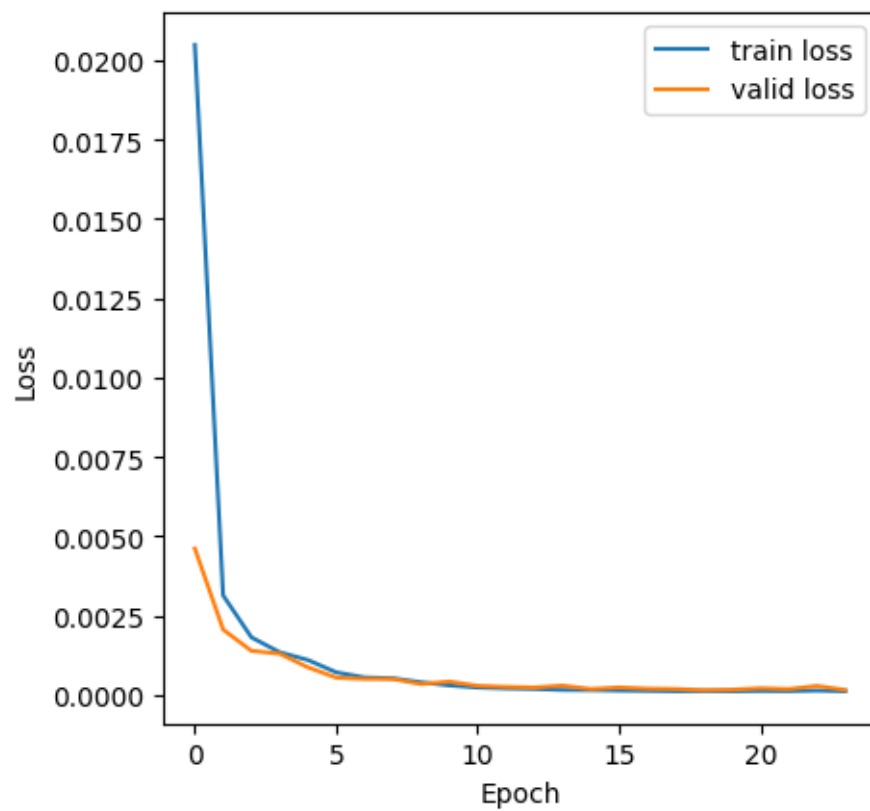
```
using: 1 pressure_230516_discrete
EARLY STOPPING @ epoch 37
min train loss: 0.00013053306889064103
min valid loss: 0.00014597187418985413
```
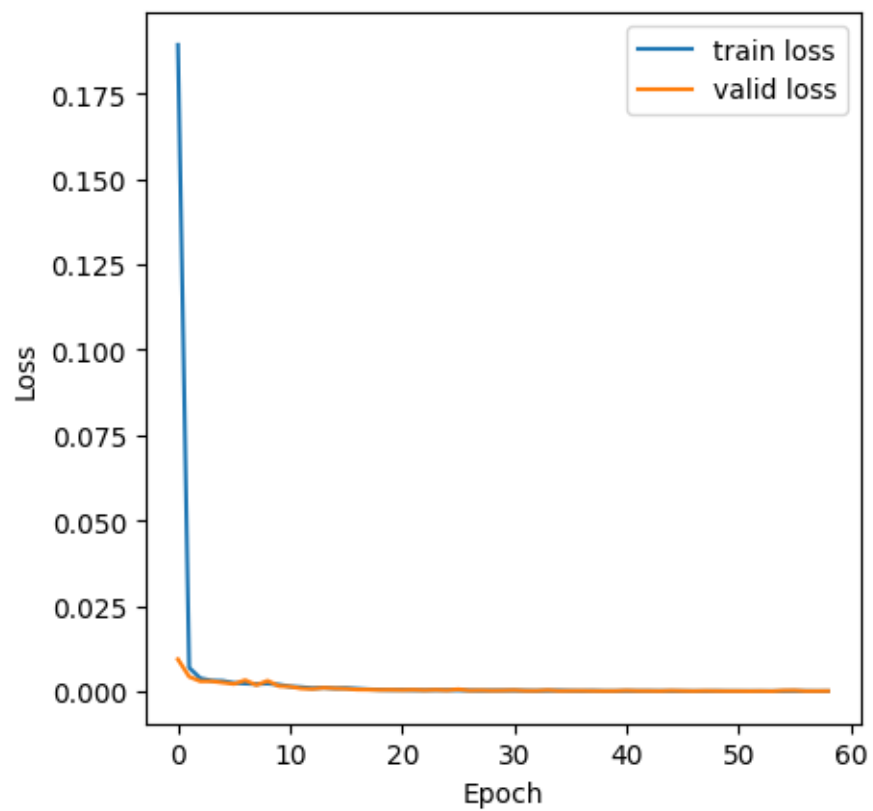
```
CV round 7_____
using: 0 temperature_230509_discrete
EARLY STOPPING @ epoch 23
min train loss: 0.00011711313125102386
min valid loss: 0.00015042623417684808
```
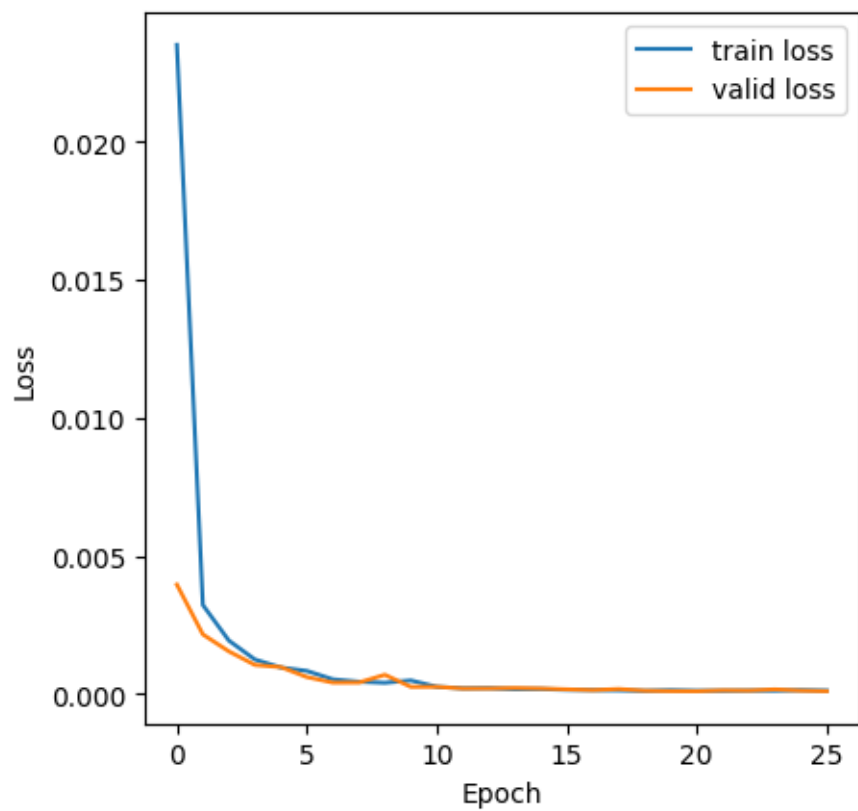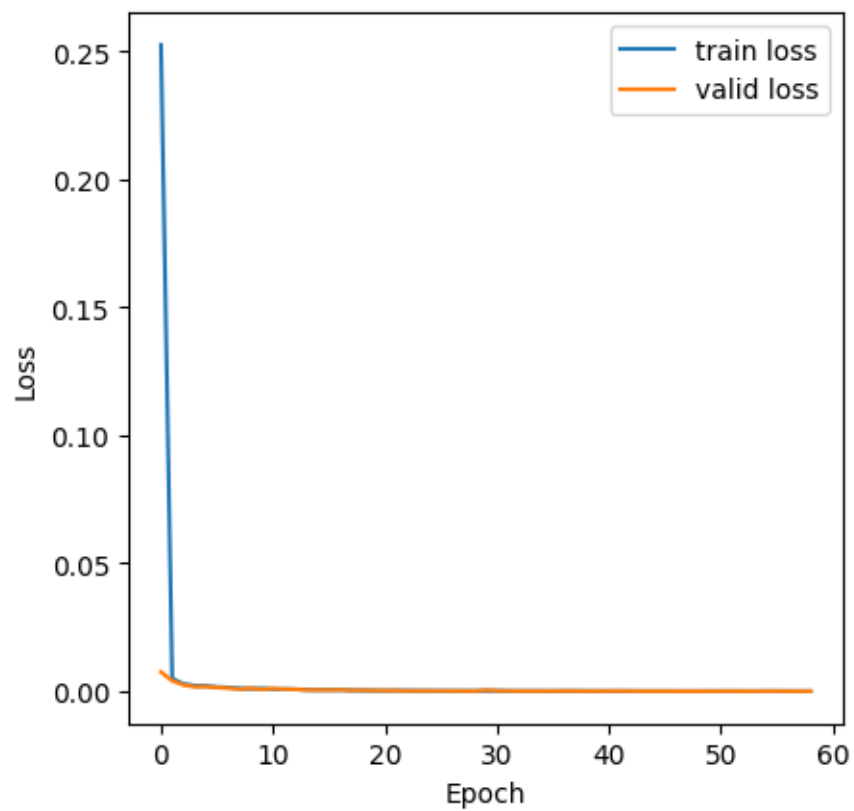
```
using: 1 pressure_230516_discrete
EARLY STOPPING @ epoch 58
min train loss: 8.567202643131498e-05
min valid loss: 7.439298724420951e-05
```
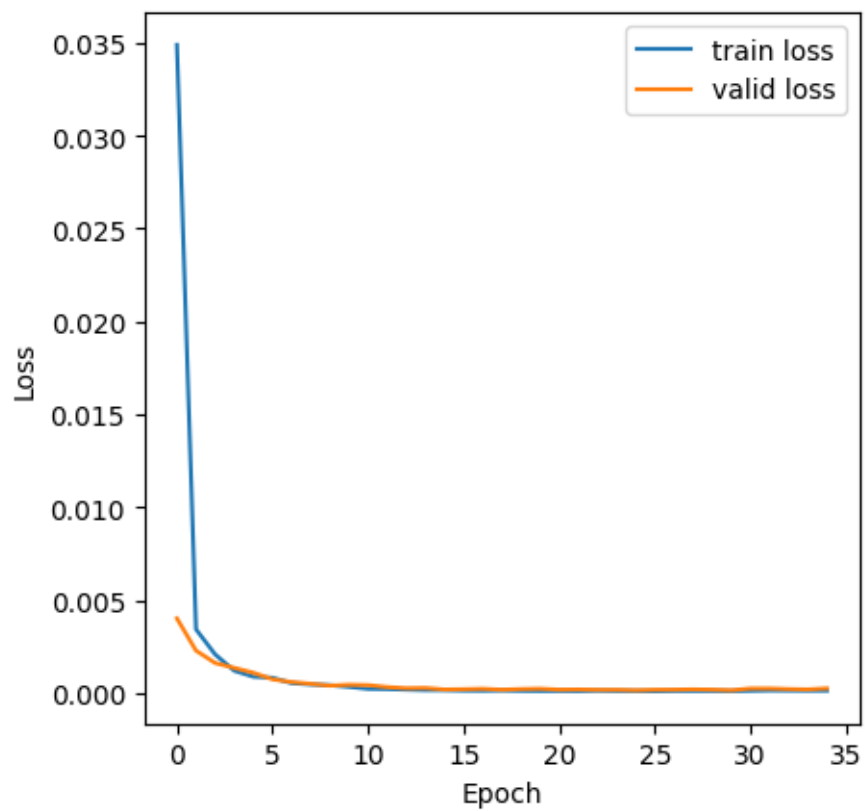
```
CV round 8_____
using: 0 temperature_230509_discrete
EARLY STOPPING @ epoch 25
min train loss: 0.00012105126585414506
min valid loss: 0.00010819074377650395
```
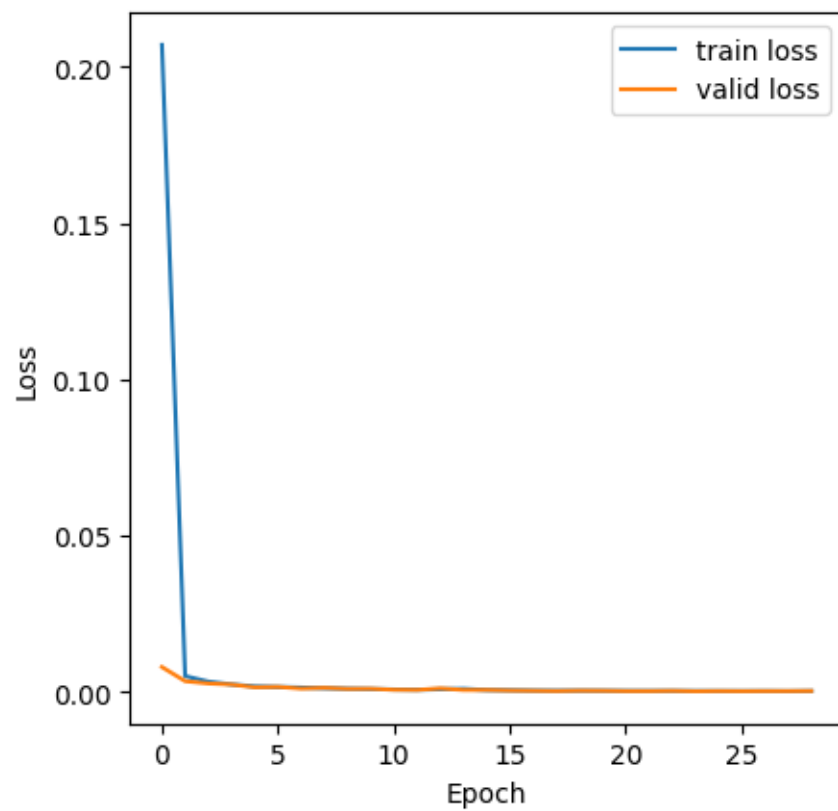
```
using: 1 pressure_230516_discrete
EARLY STOPPING @ epoch 58
min train loss: 7.30339457897406e-05
min valid loss: 6.302854444584227e-05
```
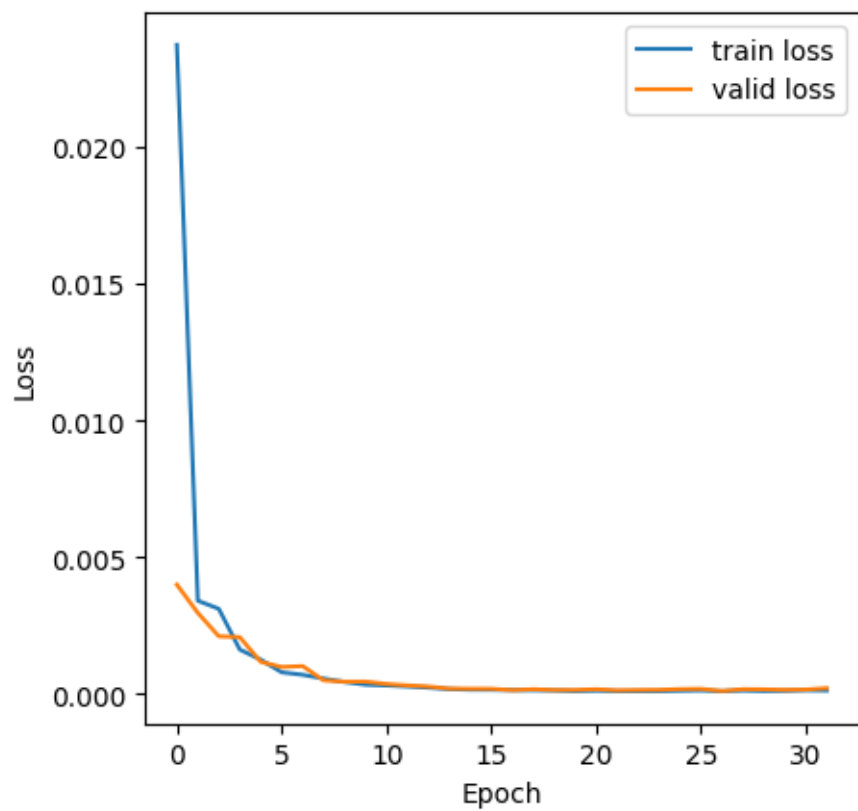
```
CV round 9_____
using: 0 temperature_230509_discrete
EARLY STOPPING @ epoch 34
min train loss: 0.00011114824194395844
min valid loss: 0.00016194578129216097
```
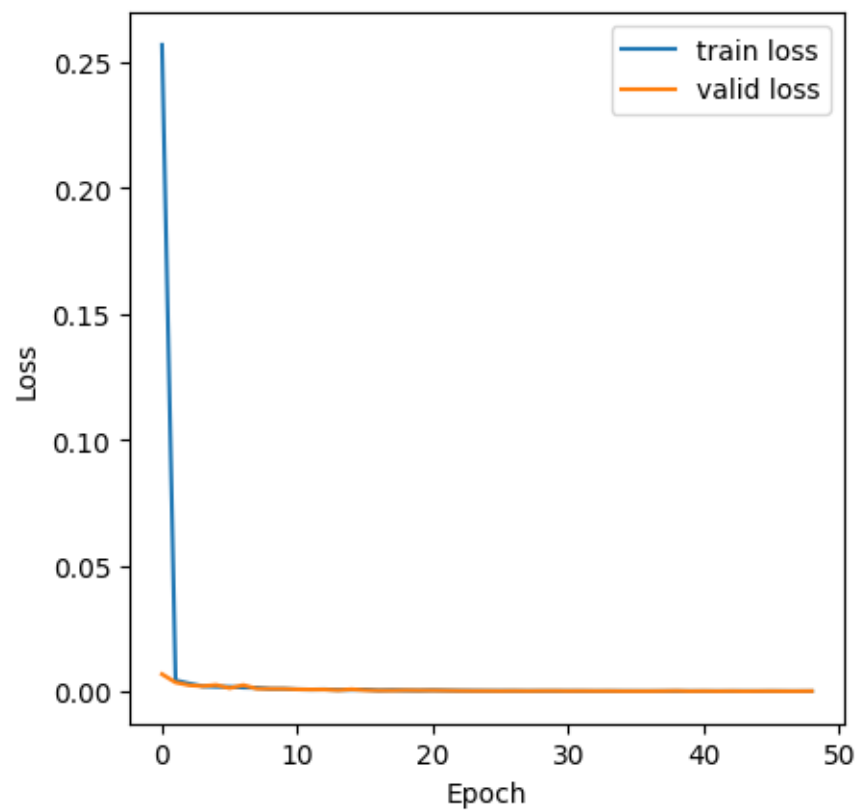
```
using: 1 pressure_230516_discrete
EARLY STOPPING @ epoch 28
min train loss: 0.00017420806702416898
min valid loss: 0.00017235895575140603
```

```
CV round 10_____
using: 0 temperature_230509_discrete
EARLY STOPPING @ epoch 31
min train loss: 0.00010392055616314465
min valid loss: 0.00011096412599727045
```
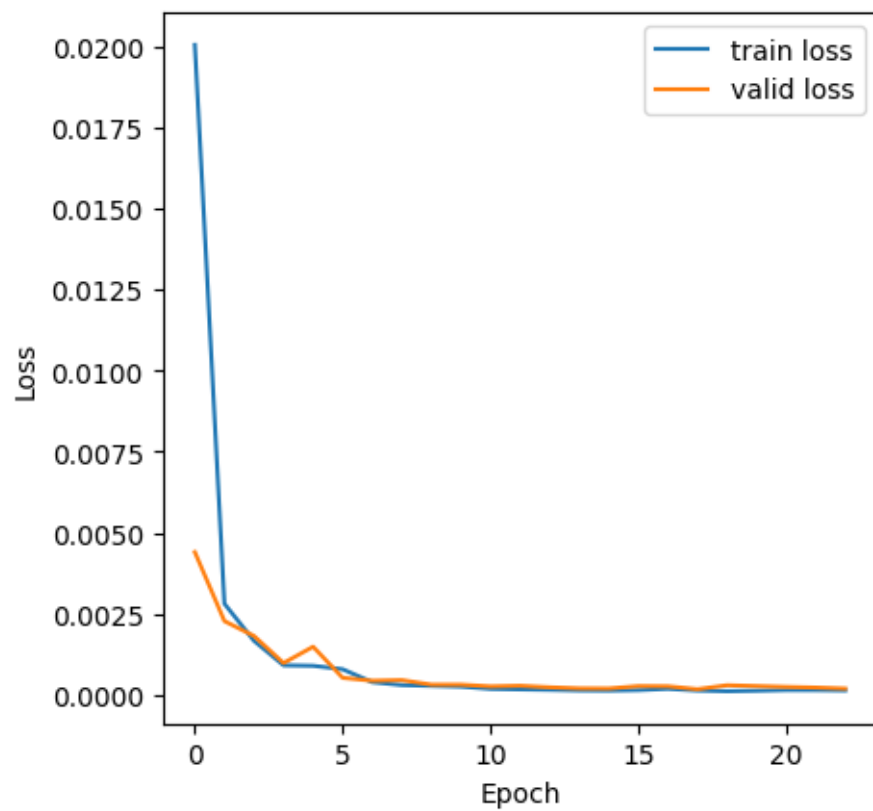
```
using: 1 pressure_230516_discrete
EARLY STOPPING @ epoch 48
min train loss: 7.479417333591051e-05
min valid loss: 8.263476411229931e-05
```
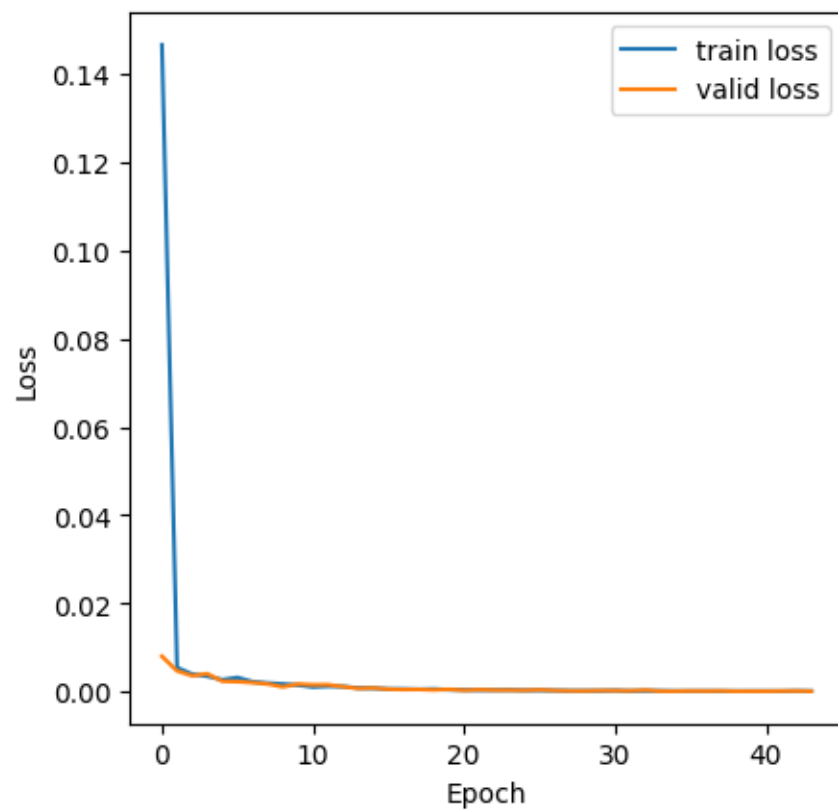
```
CV round 11_____
using: 0 temperature_230509_discrete
EARLY STOPPING @ epoch 22
min train loss: 0.00011163166560767091
min valid loss: 0.00017199143912876024
```
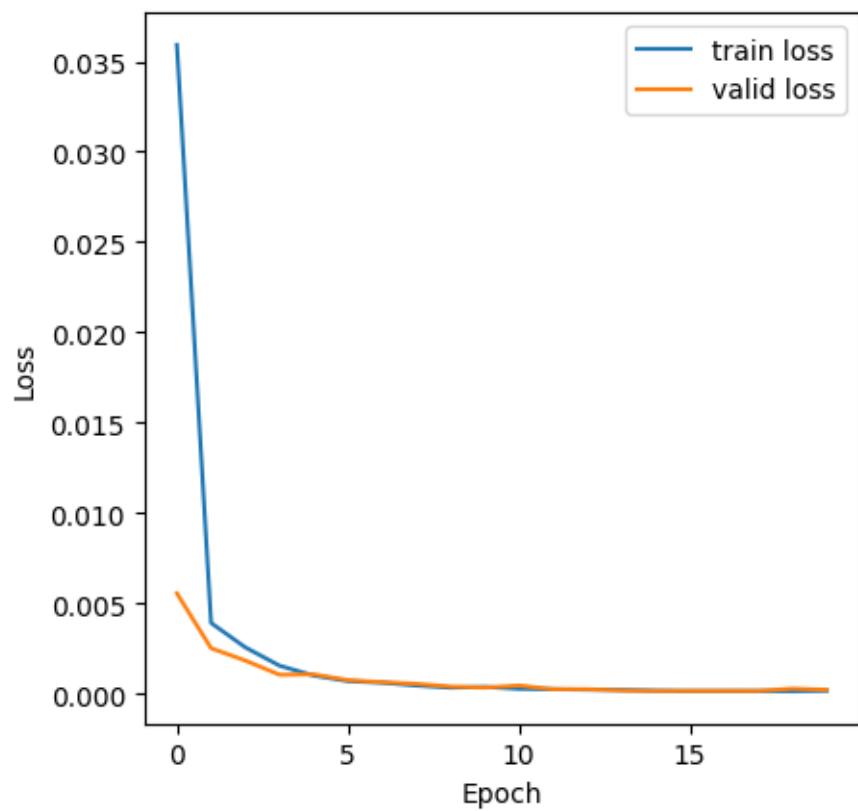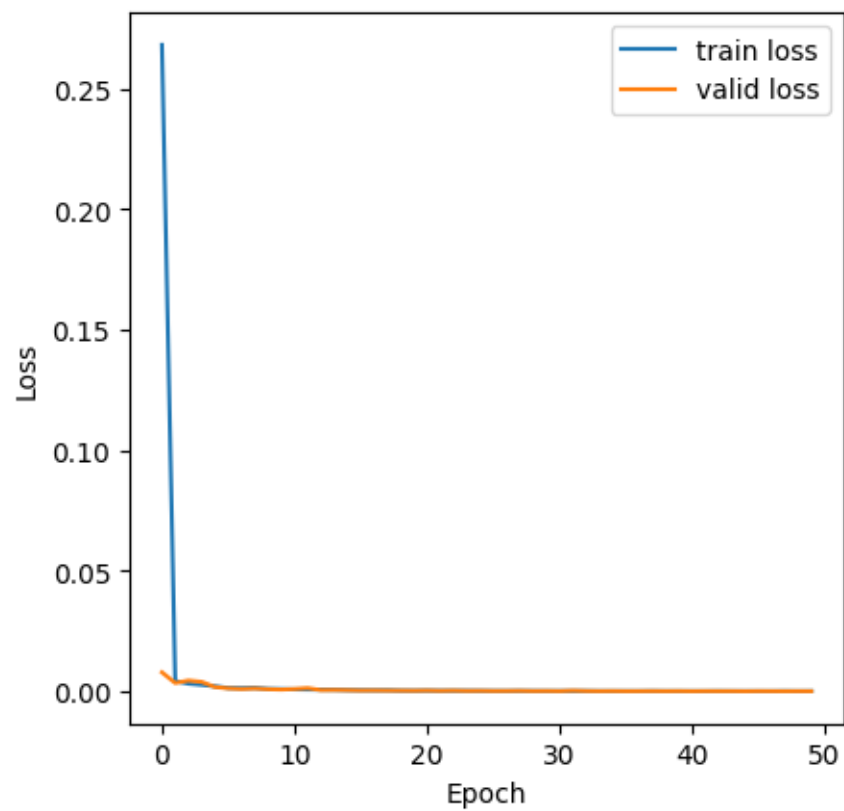
```
using: 1 pressure_230516_discrete
EARLY STOPPING @ epoch 43
min train loss: 0.000104625021843028
min valid loss: 8.471602814097423e-05
```
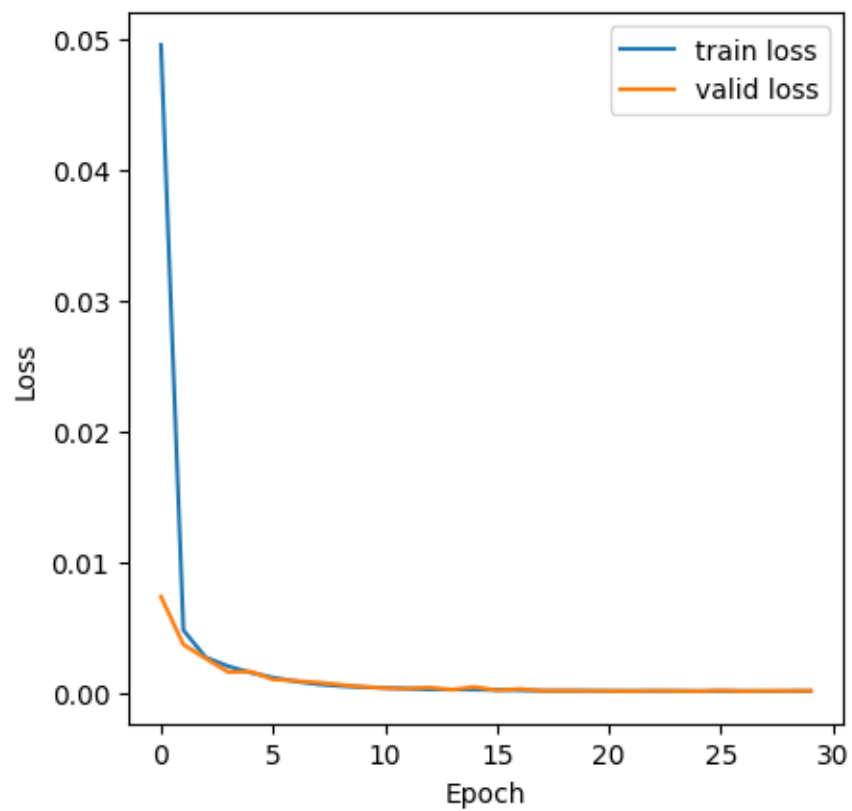
```
CV round 12_____
using: 0 temperature_230509_discrete
EARLY STOPPING @ epoch 19
min train loss: 0.00013193765770472854
min valid loss: 0.00014581185605493373
```
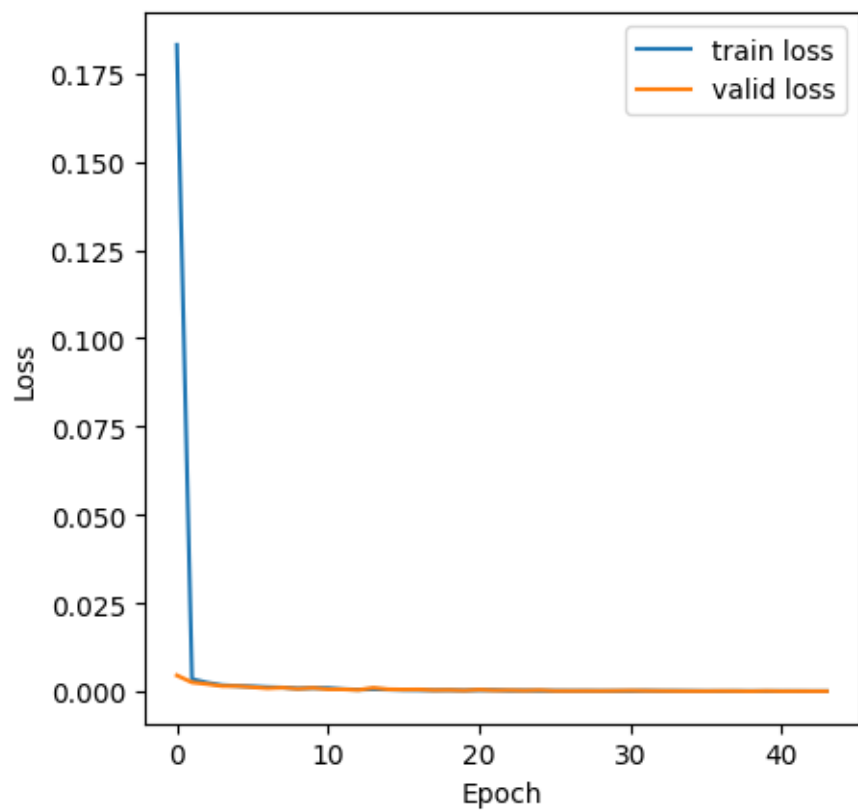
```
using: 1 pressure_230516_discrete
EARLY STOPPING @ epoch 49
min train loss: 8.396431281157261e-05
min valid loss: 9.256629255105508e-05
```
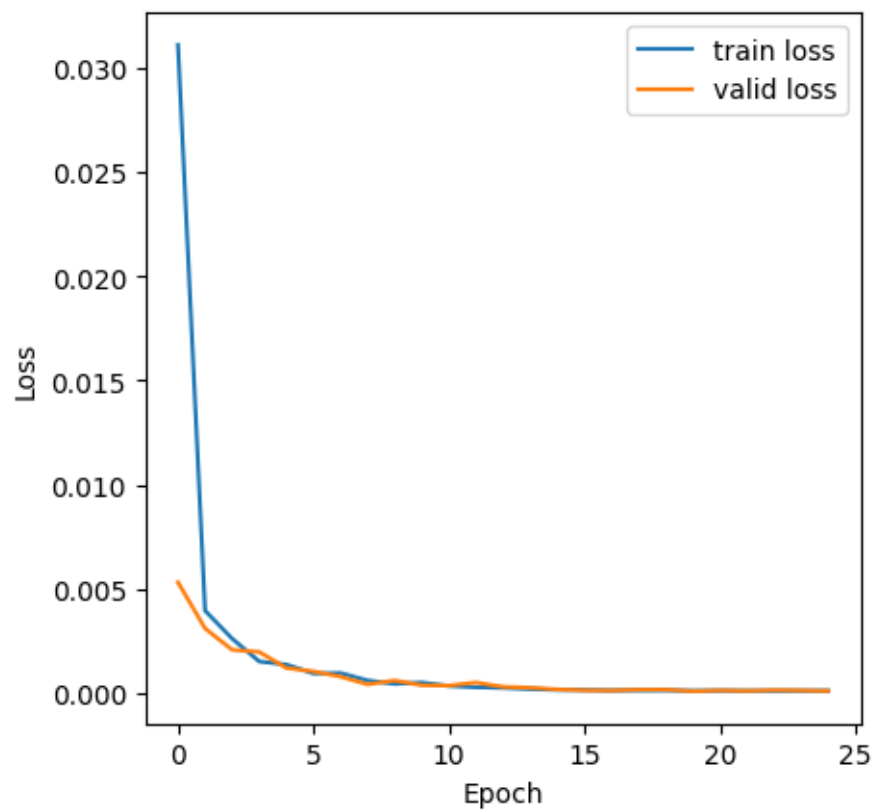
```
CV round 13_____
using: 0 temperature_230509_discrete
EARLY STOPPING @ epoch 29
min train loss: 0.0001171733976772168
min valid loss: 0.00011455815692897885
```
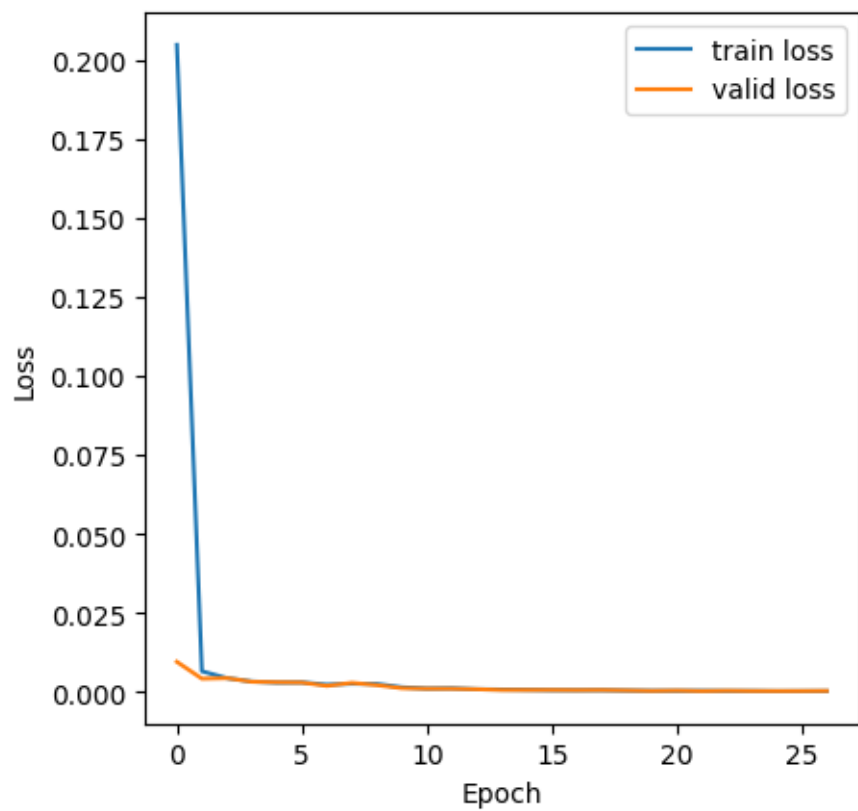
```
using: 1 pressure_230516_discrete
EARLY STOPPING @ epoch 43
min train loss: 9.277962295031598e-05
min valid loss: 8.870673809724394e-05
```

```
CV round 14_____
using: 0 temperature_230509_discrete
EARLY STOPPING @ epoch 24
min train loss: 0.00011599758098865013
min valid loss: 9.807151691347827e-05
```
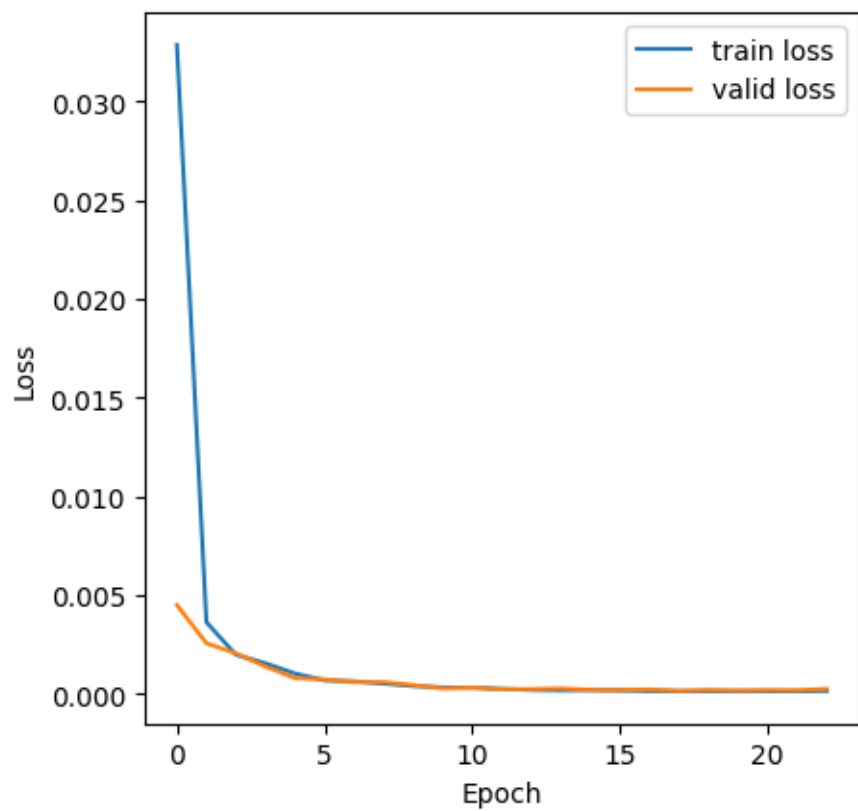
```
using: 1 pressure_230516_discrete
EARLY STOPPING @ epoch 26
min train loss: 0.00021805513467618517
min valid loss: 0.00027732469243346713
```
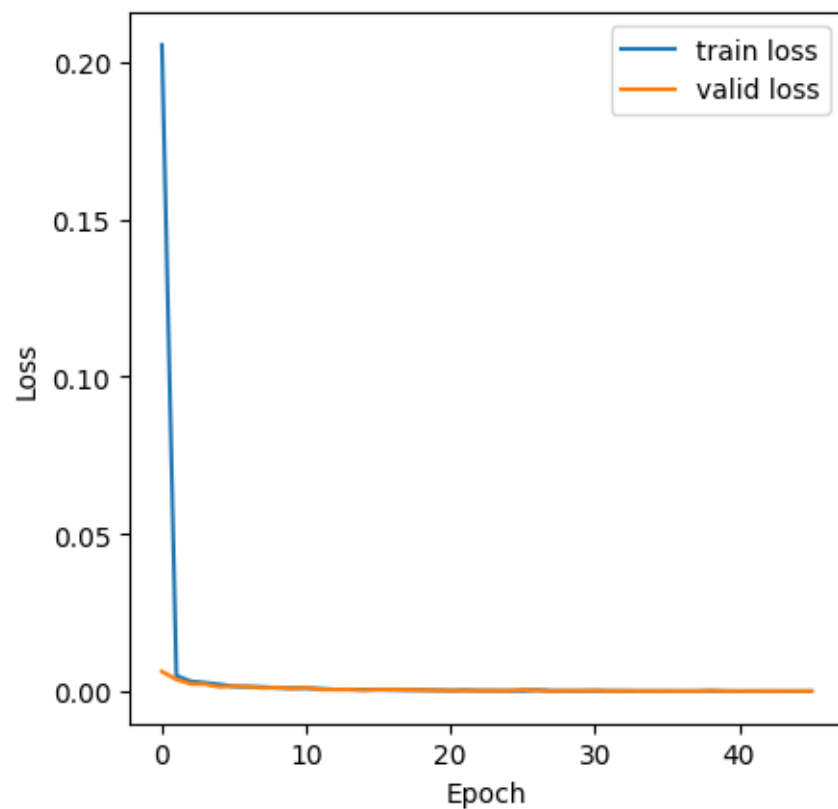
```
CV round 15_____
using: 0 temperature_230509_discrete
EARLY STOPPING @ epoch 22
min train loss: 0.00013249268434292665
min valid loss: 0.00015180374030023813
```

```
using: 1 pressure_230516_discrete
EARLY STOPPING @ epoch 45
min train loss: 0.00010842921500708061
min valid loss: 0.00010301644730764227
```

BEST model: CV=8.pth with 6.302854444584227e-05
trained datas sequentially
Aggregate performance: yo
temperature_230509_discrete: Valid loss mean 0.0001348252549632889, std
3.671448498171672e-05
pressure_230516_discrete: Valid loss mean 0.0001267935881514859, std
7.996394728981855e-05
  TRAINing COMPLETE_____
TEST_____
Testing temperature_230509_discrete, loss: 0.320424873577921
Testing pressure_230516_discrete, loss: 8.070830926953931e-05