SiameseAux

August 9, 2023

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

The autoreload extension is already loaded. To reload it, use:
  %reload_ext autoreload

```python
[12]:  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
```

[30]:
```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: pressure_230516_discrete
        1: temperature_230509_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 pressure_230516_discrete
EARLY STOPPING @ epoch 24
min train loss: 0.00024648477106397465
min valid loss: 0.00026722192160377745
```
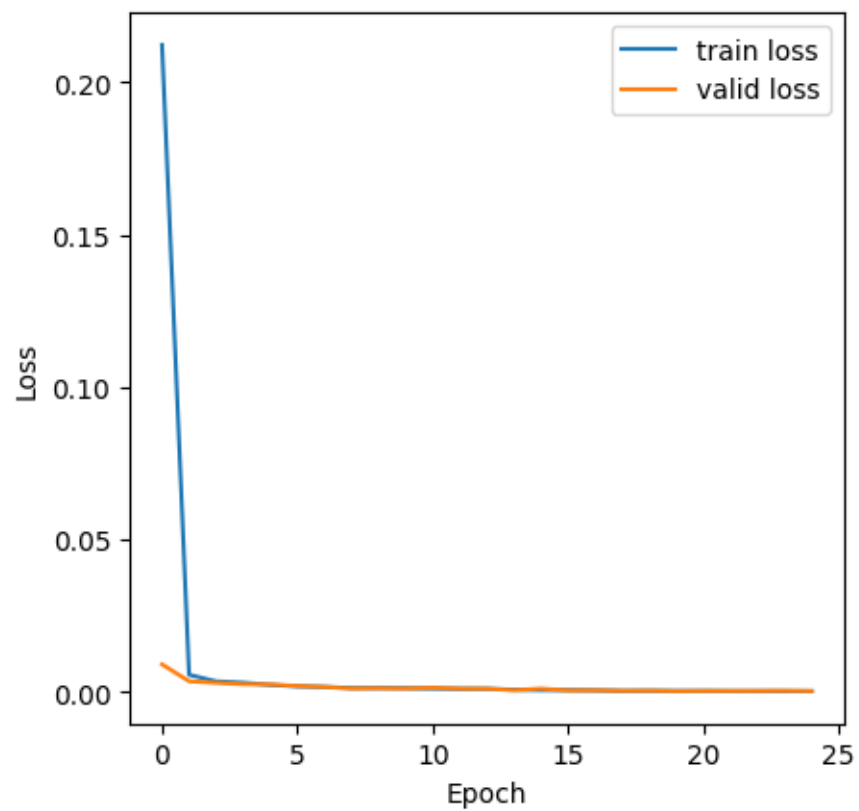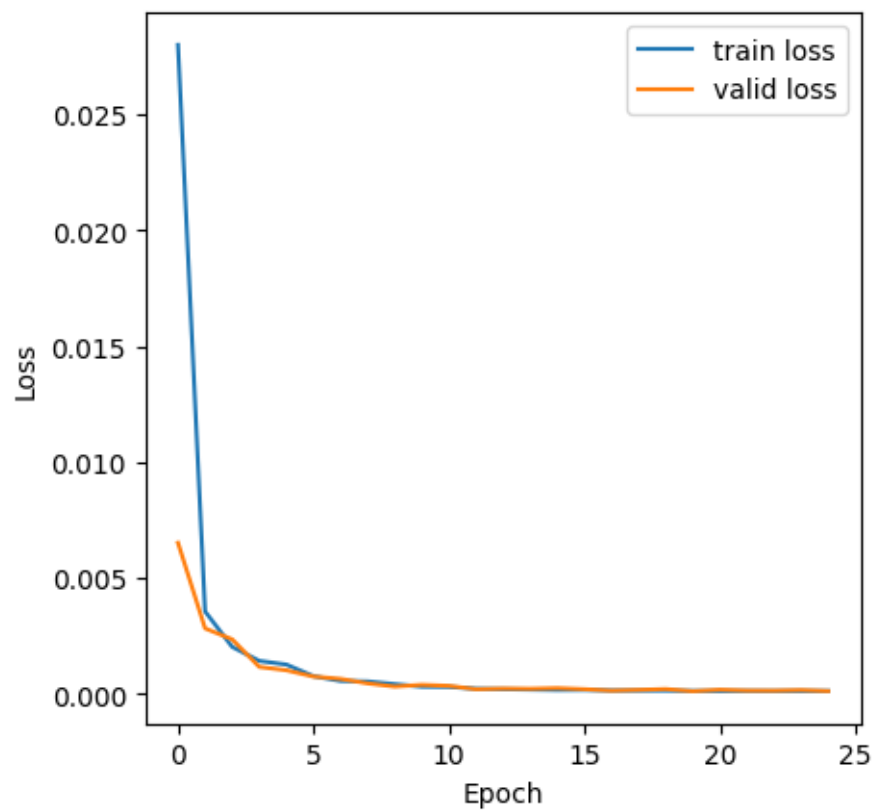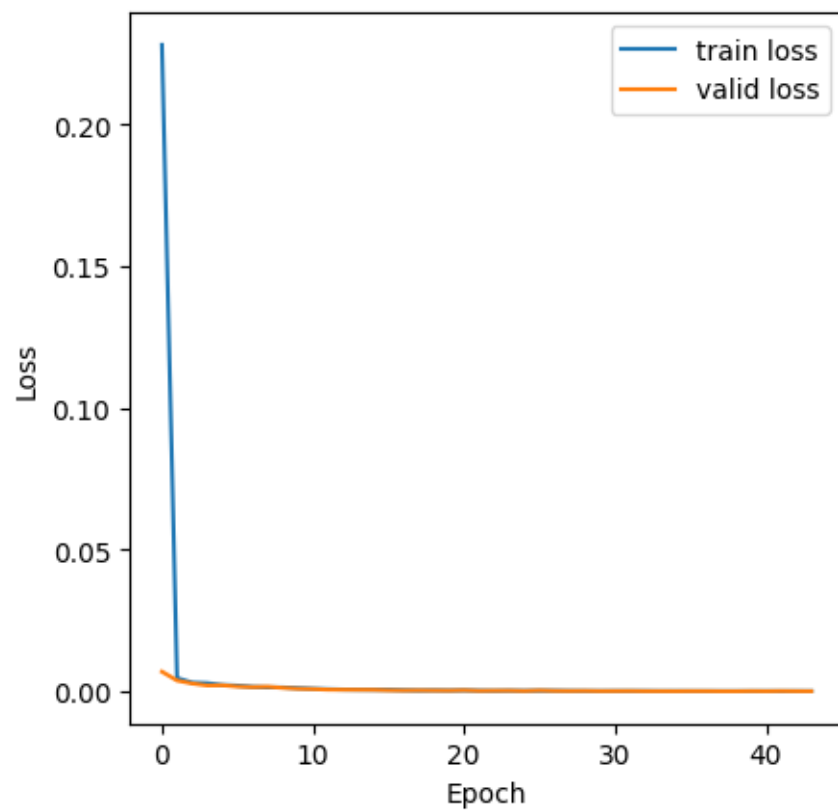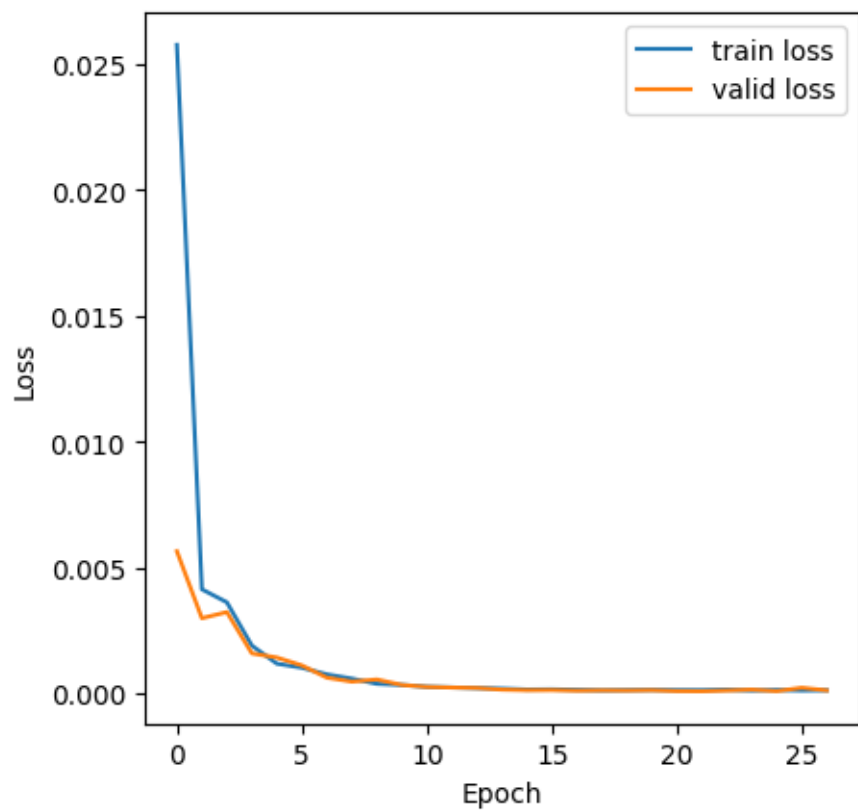
```
using: 1 temperature_230509_discrete
EARLY STOPPING @ epoch 24
min train loss: 0.00011264106119183866
min valid loss: 0.00010727226472226903
```
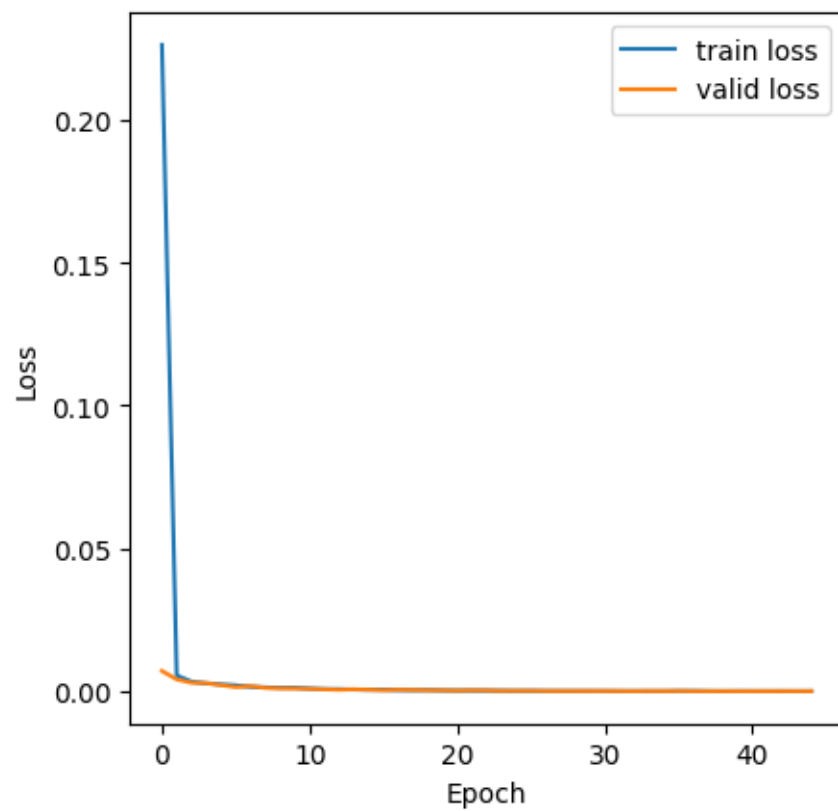
```
CV round 1_____
using: 0 pressure_230516_discrete
EARLY STOPPING @ epoch 43
min train loss: 0.00011598696708626283
min valid loss: 0.00010247117279504891
```
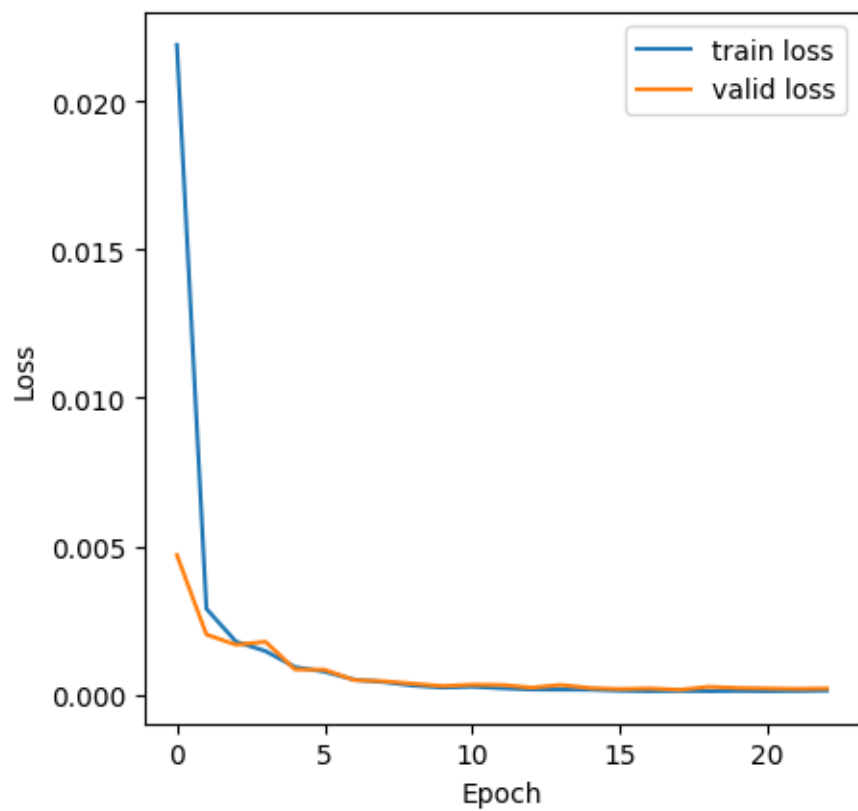
```
using: 1 temperature_230509_discrete
EARLY STOPPING @ epoch 26
min train loss: 0.00010837678768659703
min valid loss: 7.995304549694993e-05
```
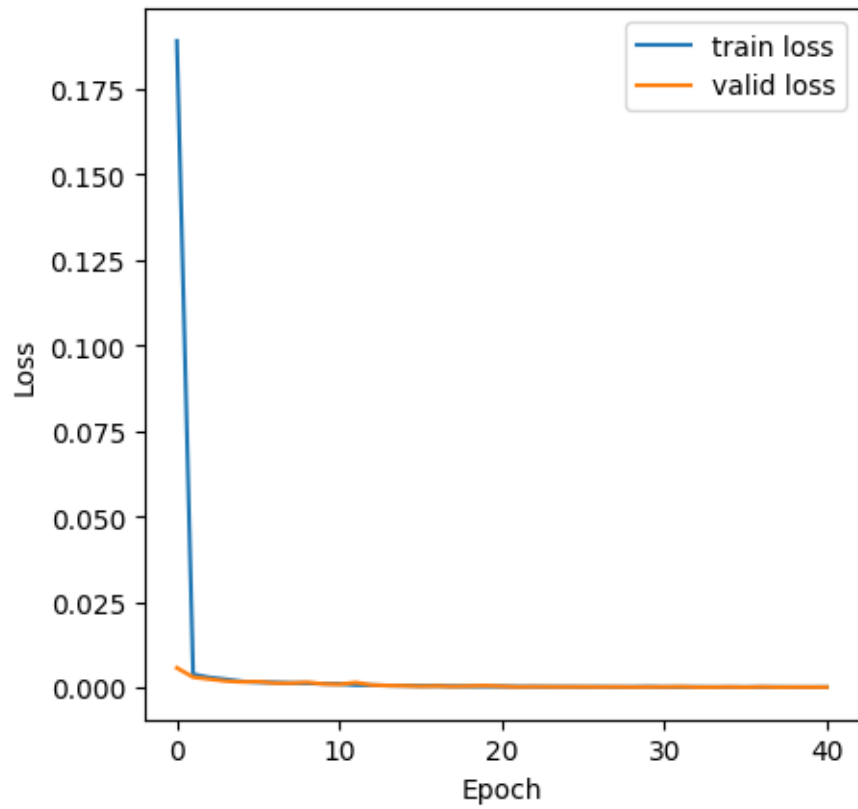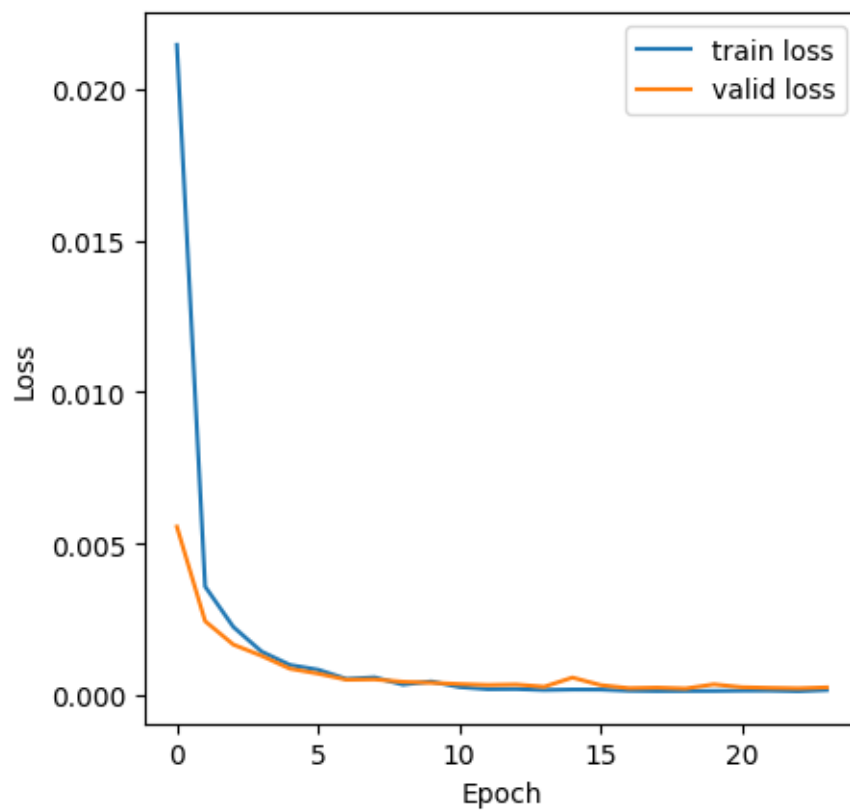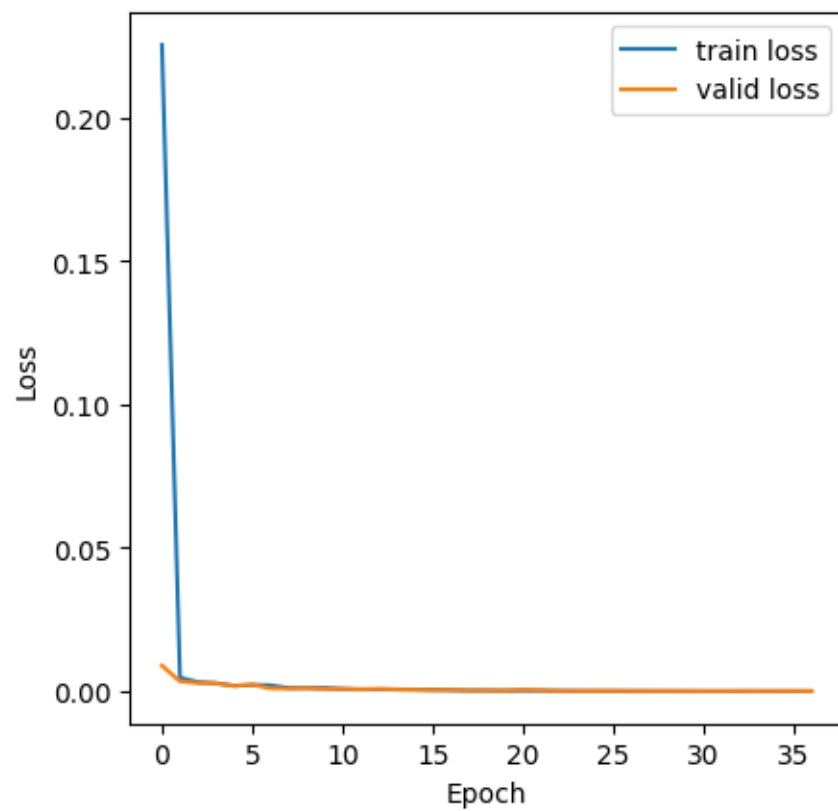
CV round 2_____
using: 0 pressure_230516_discrete
EARLY STOPPING @ epoch 44
min train loss: 8.573525728107515e-05
min valid loss: 9.435970878257649e-05

```
using: 1 temperature_230509_discrete
EARLY STOPPING @ epoch 22
min train loss: 0.00011686904133856649
min valid loss: 0.00016471088529215194
```

CV round 3_____
using: 0 pressure_230516_discrete
EARLY STOPPING @ epoch 40
min train loss: 9.65110964237035e-05
min valid loss: 9.612369376554852e-05

```
using: 1 temperature_230509_discrete
EARLY STOPPING @ epoch 23
min train loss: 0.0001303383384462601
min valid loss: 0.00021807351004099473
```

```
CV round 4_____
using: 0 pressure_230516_discrete
EARLY STOPPING @ epoch 36
min train loss: 9.635107906598767e-05
min valid loss: 0.00011880970760103082
```

```
using: 1 temperature_230509_discrete
EARLY STOPPING @ epoch 34
min train loss: 0.00010742221941958026
min valid loss: 8.419970545219258e-05
```
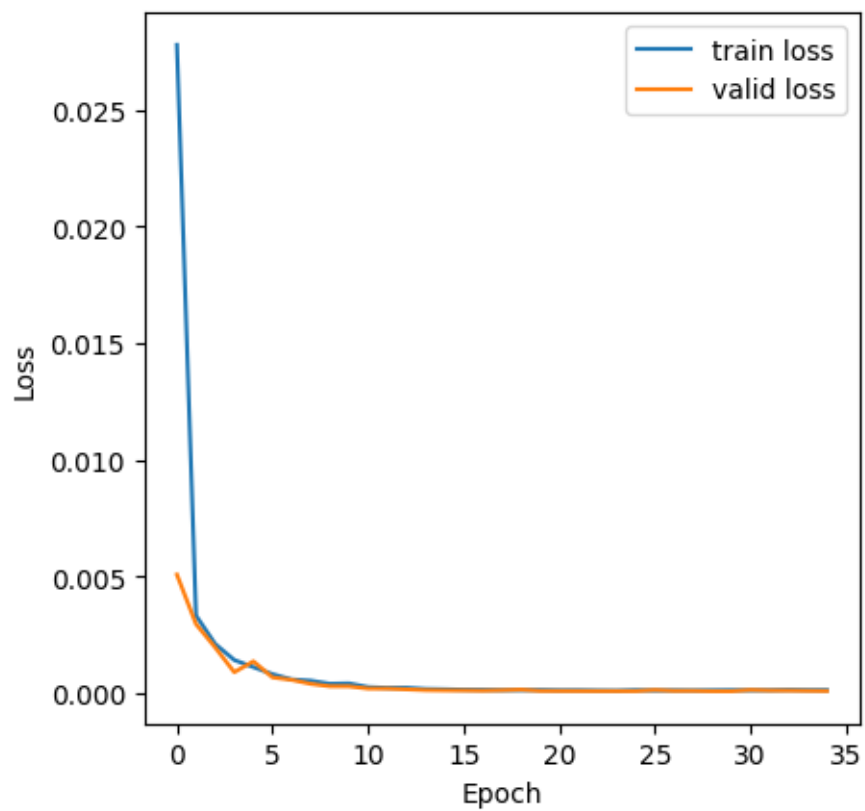
```
CV round 5_____
using: 0 pressure_230516_discrete
EARLY STOPPING @ epoch 24
min train loss: 0.00024345555310984228
min valid loss: 0.00023170377426140476
```
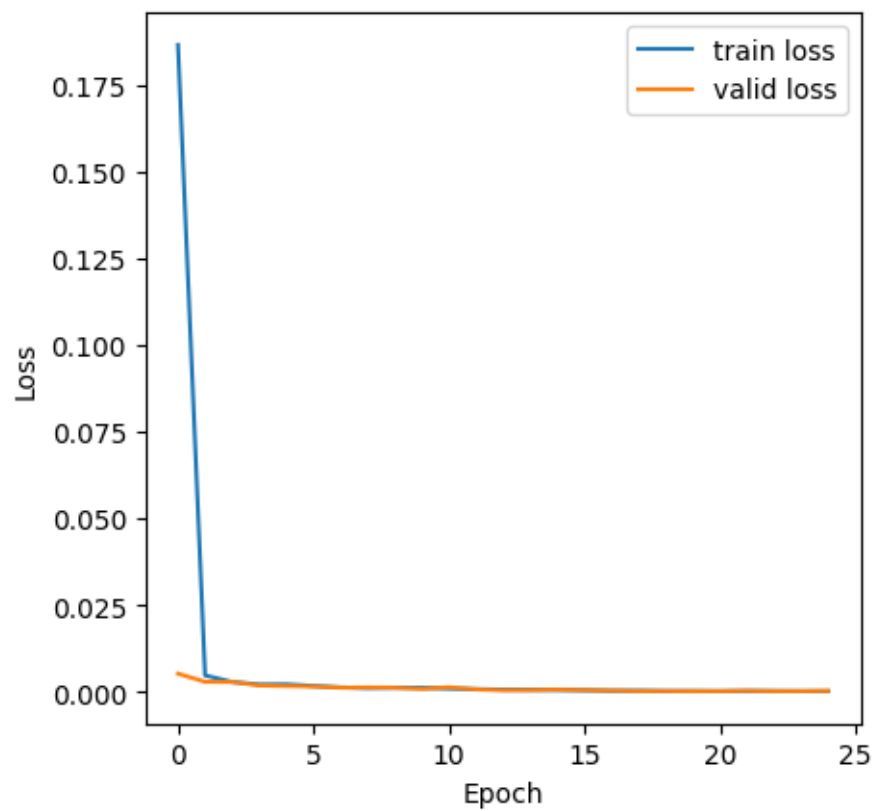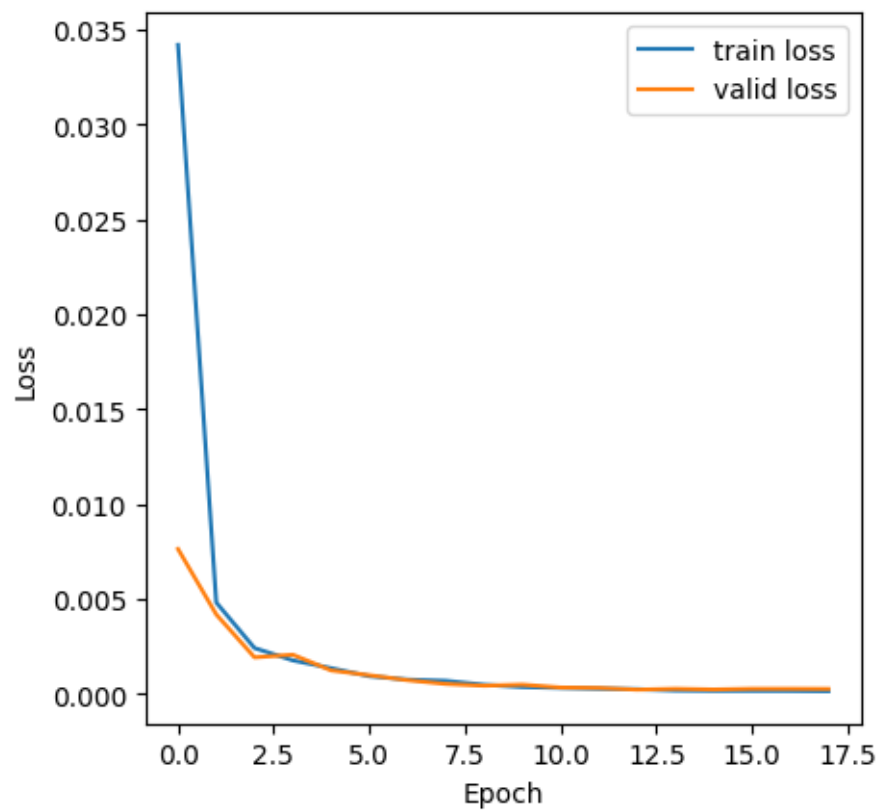
```
using: 1 temperature_230509_discrete
EARLY STOPPING @ epoch 23
min train loss: 0.00012869899199524133
min valid loss: 0.00010154373667319306
```
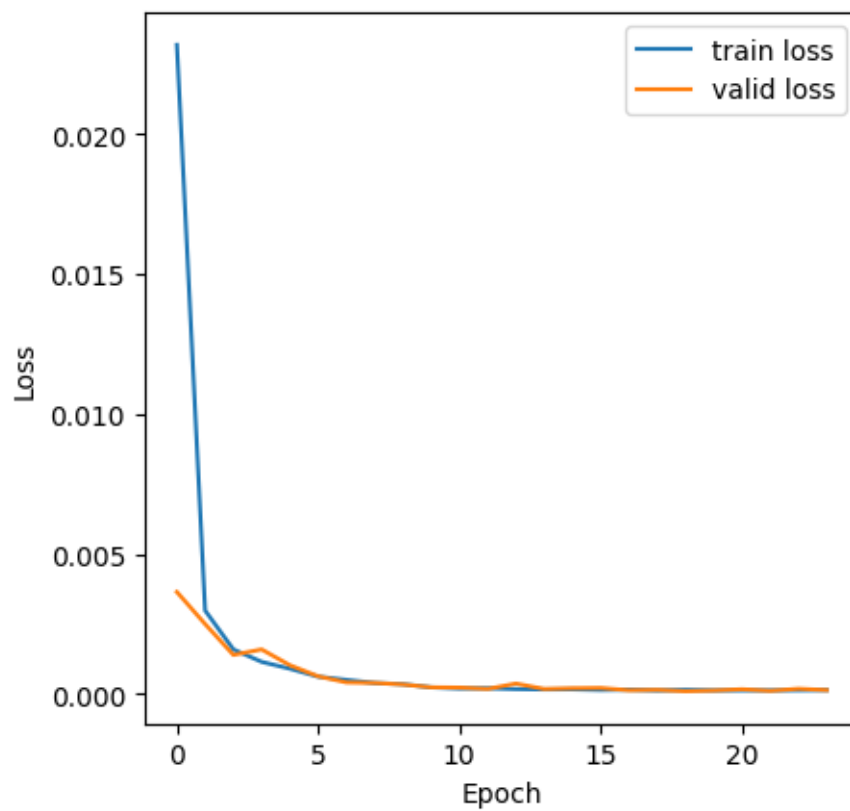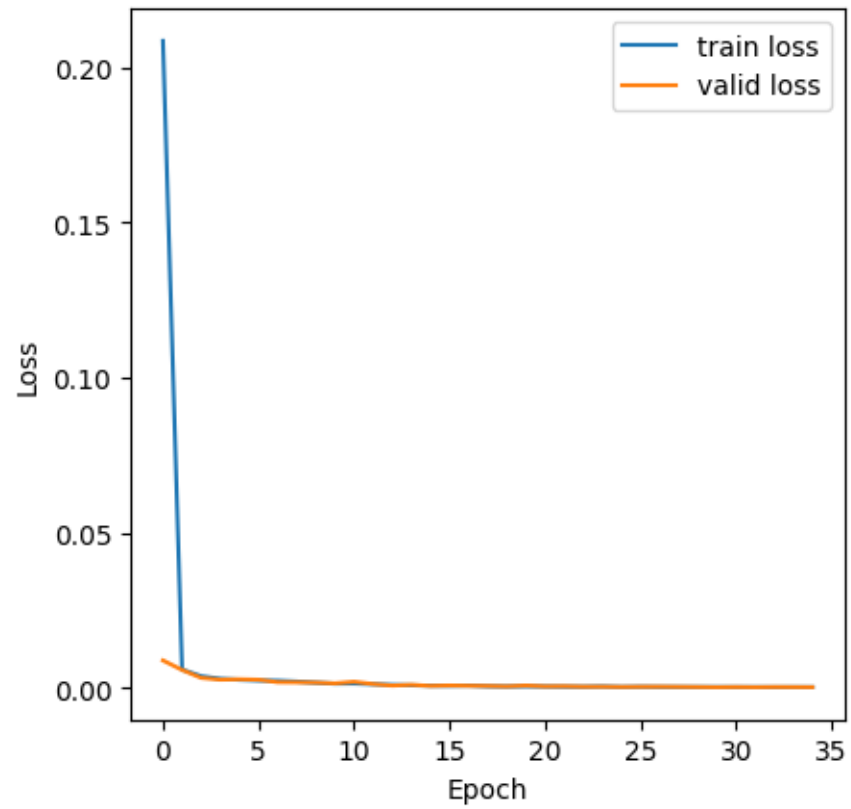
```
CV round 6_____
using: 0 pressure_230516_discrete
EARLY STOPPING @ epoch 60
min train loss: 7.89855866804084e-05
min valid loss: 6.149772298158496e-05
```
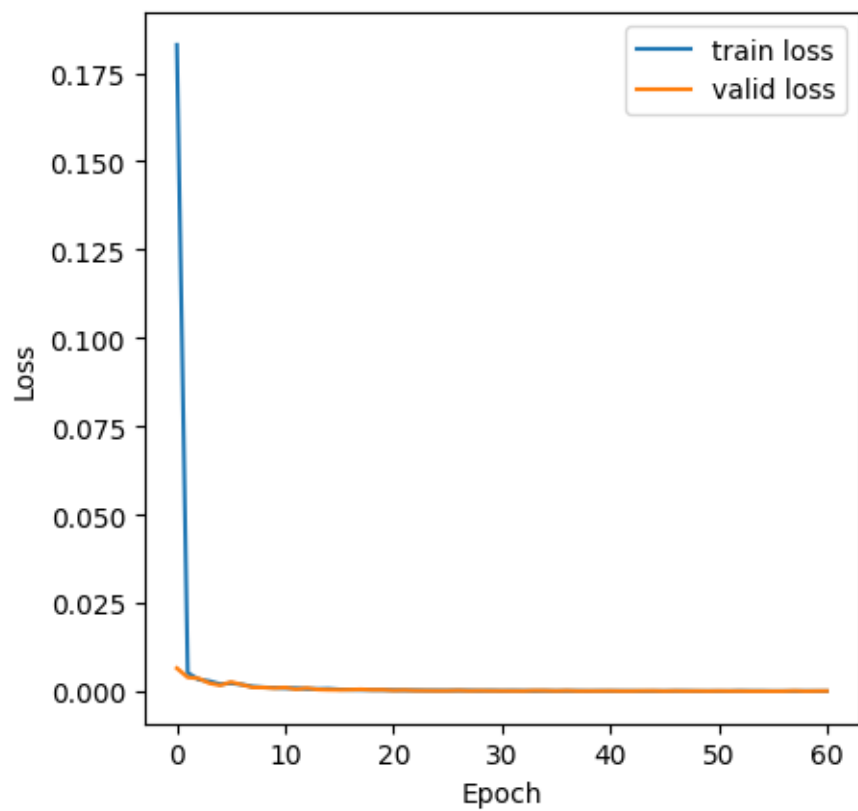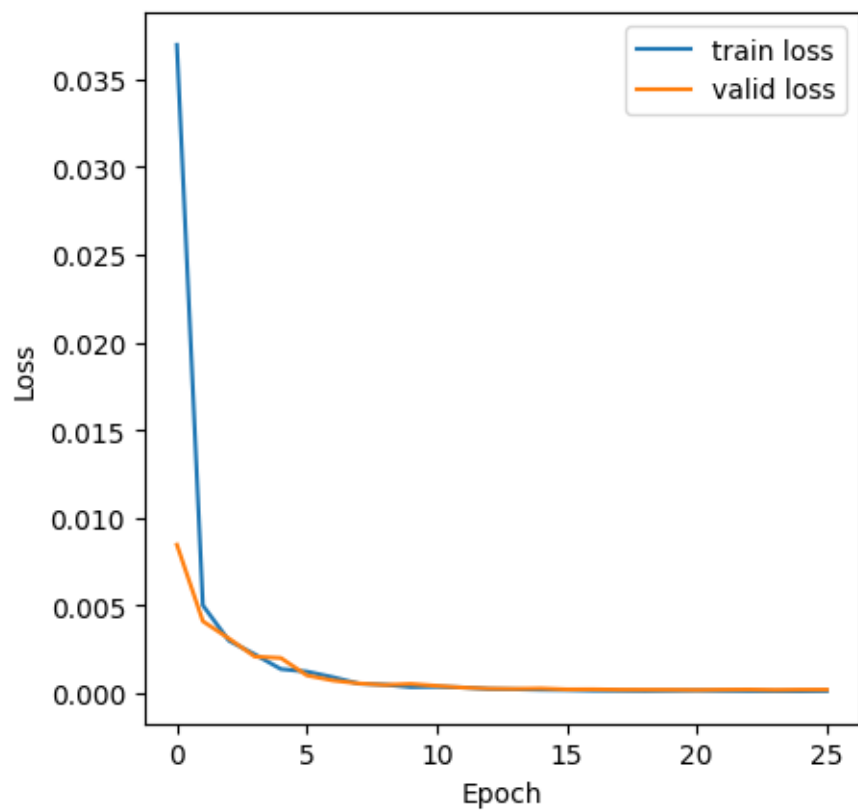
```
using: 1 temperature_230509_discrete
EARLY STOPPING @ epoch 17
min train loss: 0.00013813227297126133
min valid loss: 0.00021958605211693793
```
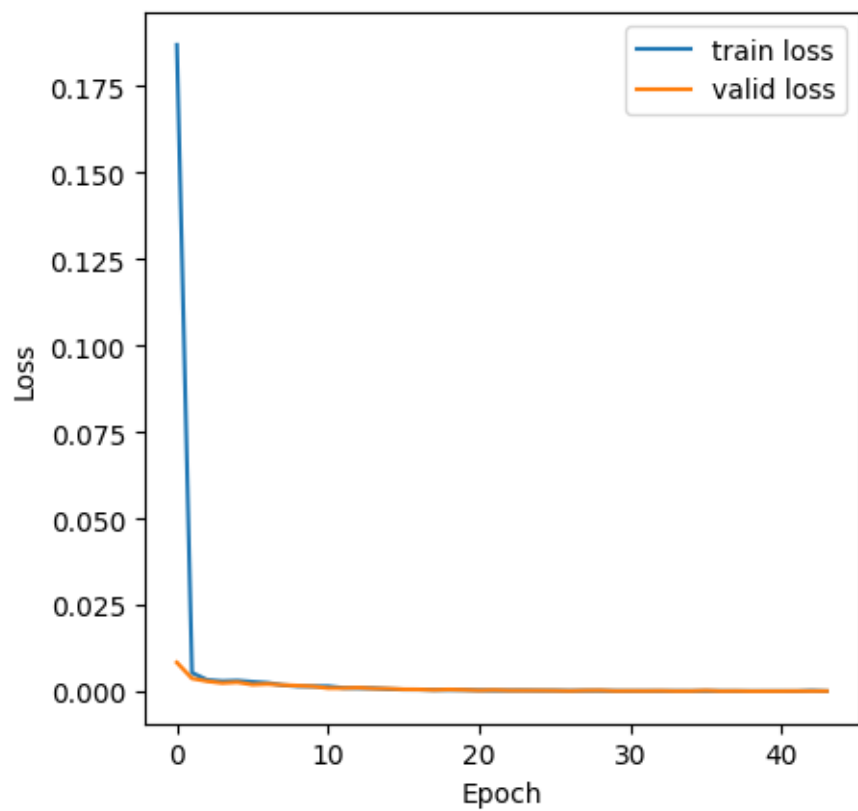
```
CV round 7_____
using: 0 pressure_230516_discrete
EARLY STOPPING @ epoch 34
min train loss: 0.0001424075092390095
min valid loss: 0.0001497349967394257
```
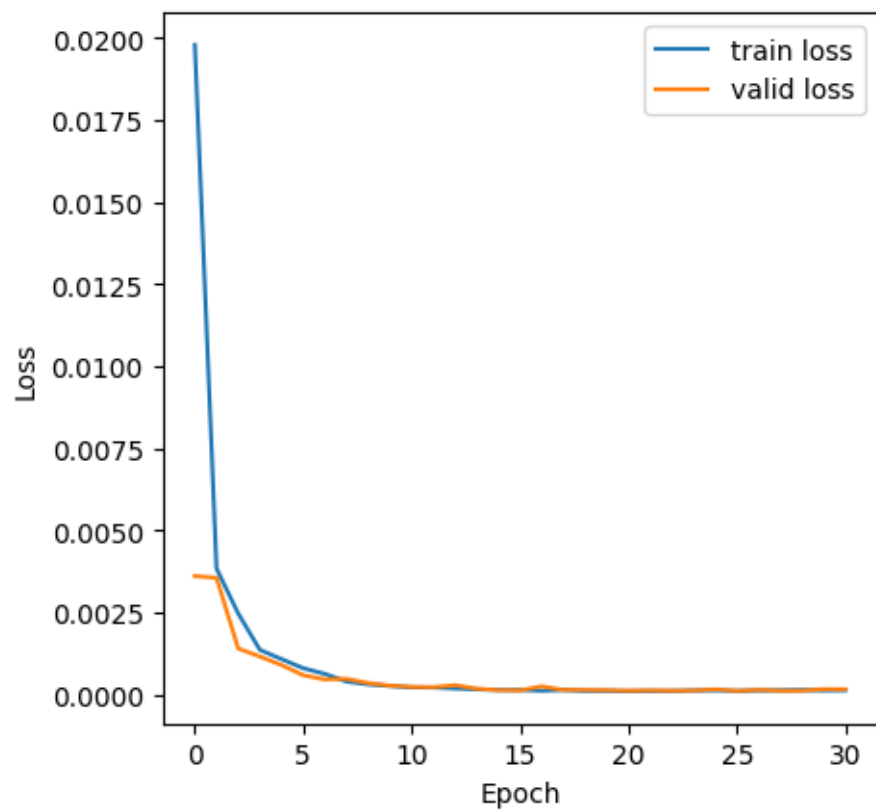
```
using: 1 temperature_230509_discrete
EARLY STOPPING @ epoch 25
min train loss: 0.00010956409735654509
min valid loss: 0.00017813051235862076
```
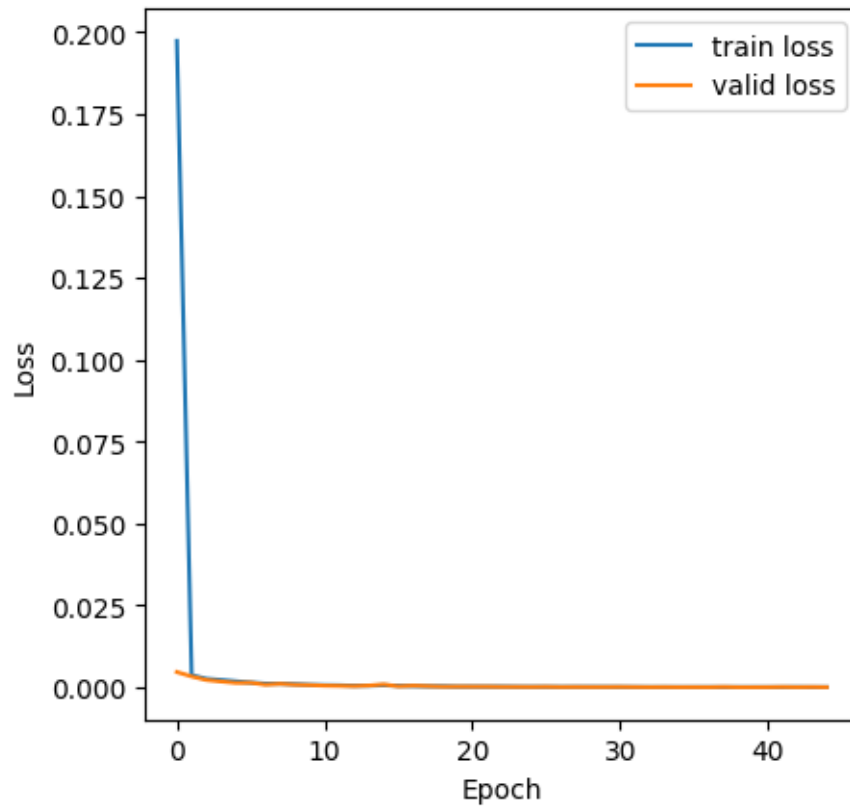
```
CV round 8_____
using: 0 pressure_230516_discrete
EARLY STOPPING @ epoch 43
min train loss: 9.113066156384196e-05
min valid loss: 0.00010109323102369672
```
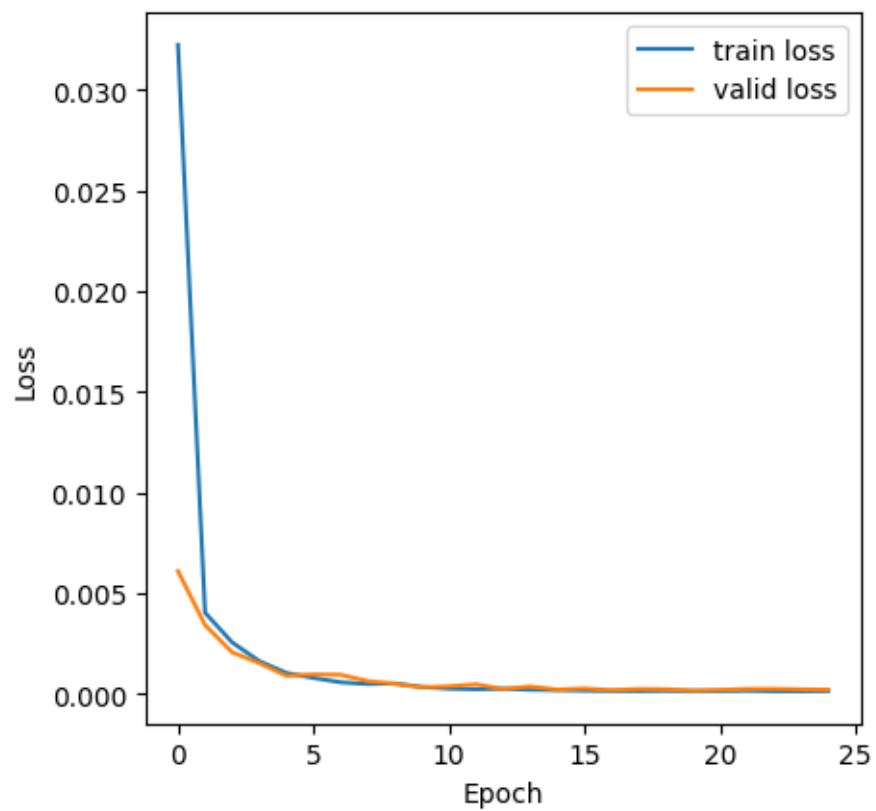
```
using: 1 temperature_230509_discrete
EARLY STOPPING @ epoch 30
min train loss: 0.00010014452323737328
min valid loss: 0.00010939334351860453
```
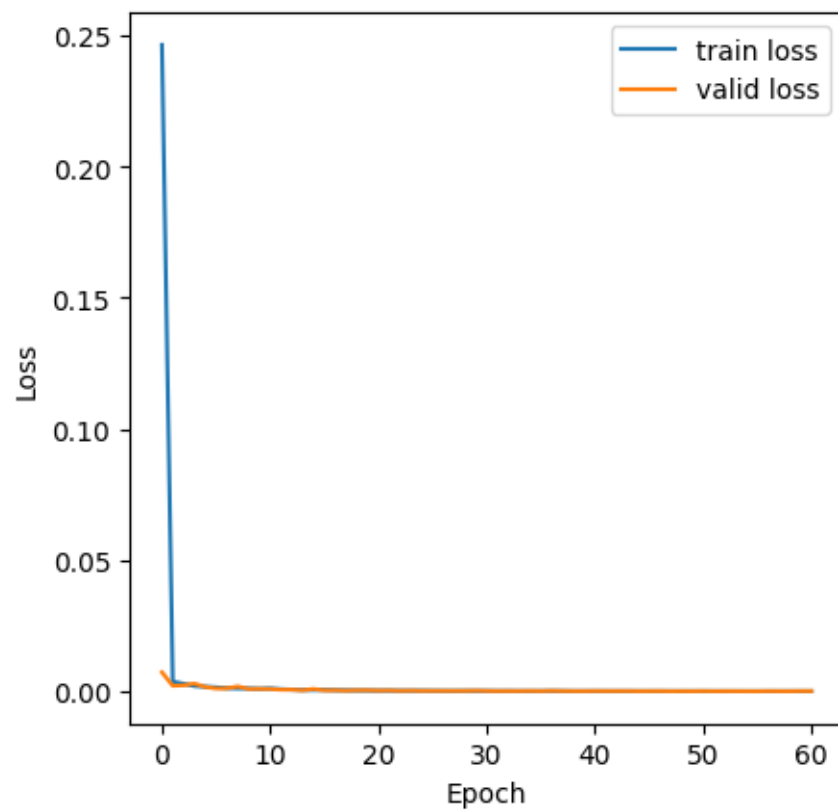
```
CV round 9_____
using: 0 pressure_230516_discrete
EARLY STOPPING @ epoch 44
min train loss: 8.161556940070692e-05
min valid loss: 7.658924914721865e-05
```
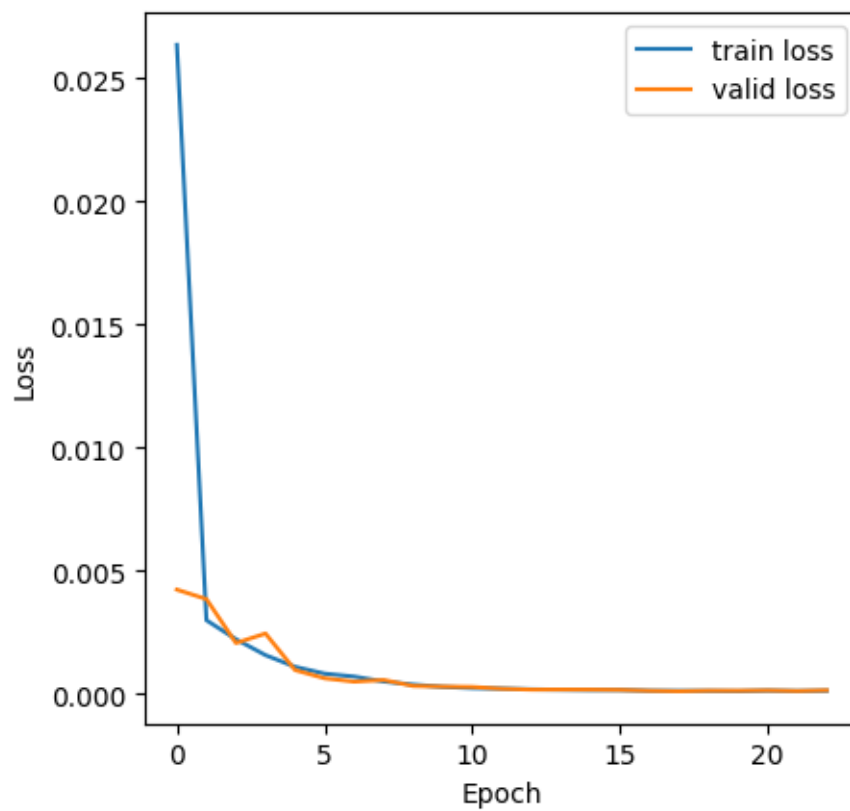
using: 1 temperature_230509_discrete
EARLY STOPPING @ epoch 24
min train loss: 0.00011510370517719298
min valid loss: 0.00014771526330150663

```
CV round 10_____
using: 0 pressure_230516_discrete
EARLY STOPPING @ epoch 60
min train loss: 6.741479764142158e-05
min valid loss: 6.69750697852578e-05
```
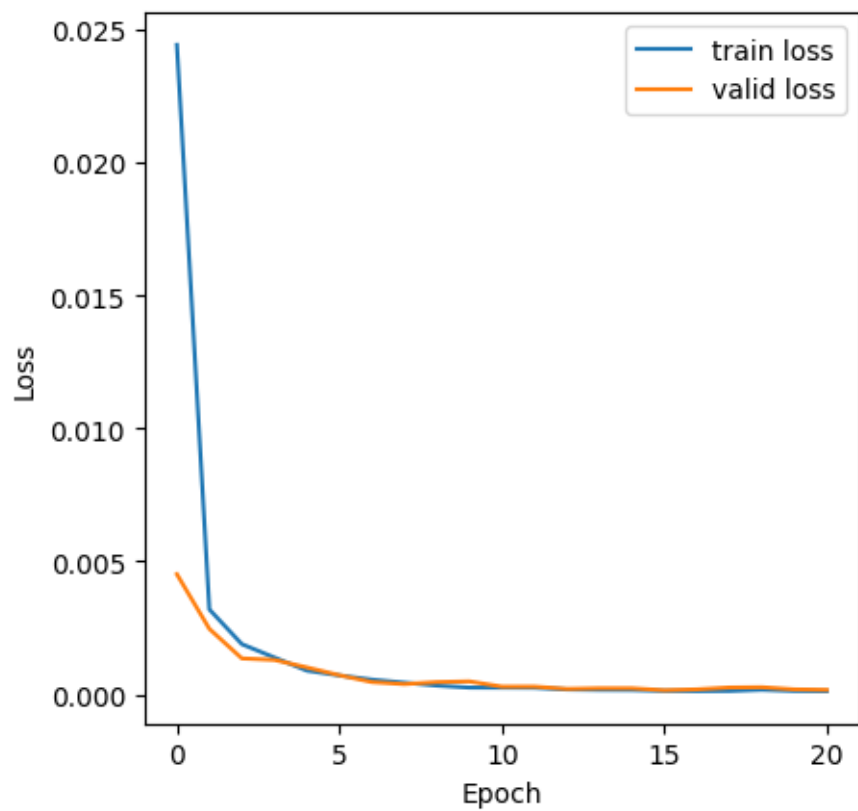
using: 1 temperature_230509_discrete
EARLY STOPPING @ epoch 22
min train loss: 0.00010919750986266246
min valid loss: 0.00010808422157424503

CV round 11_____
using: 0 pressure_230516_discrete
EARLY STOPPING @ epoch 37
min train loss: 0.00013719238658350976
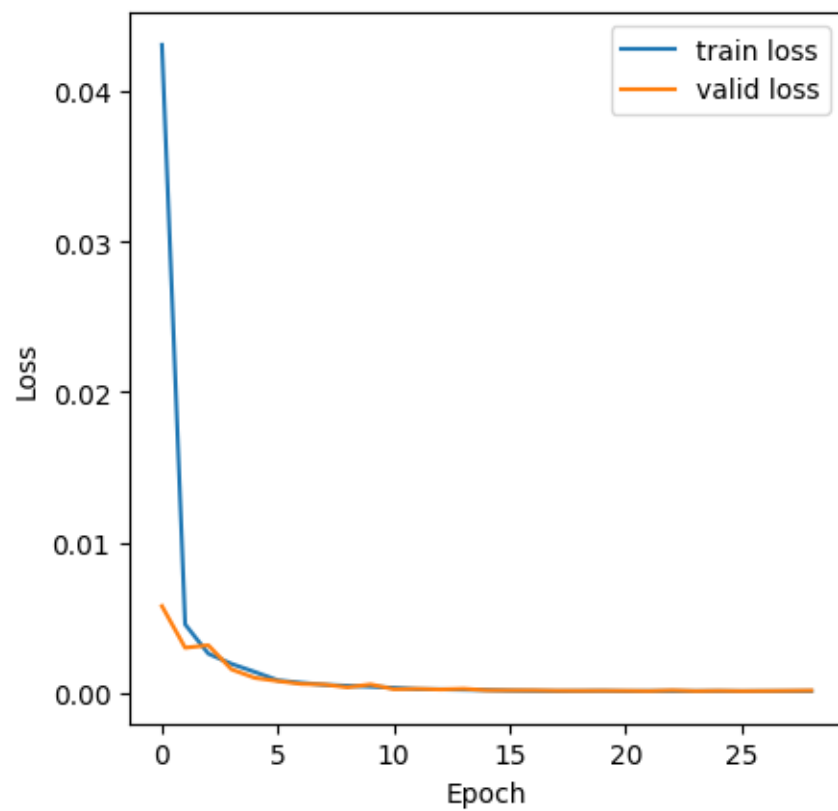min valid loss: 0.00015345322935900185
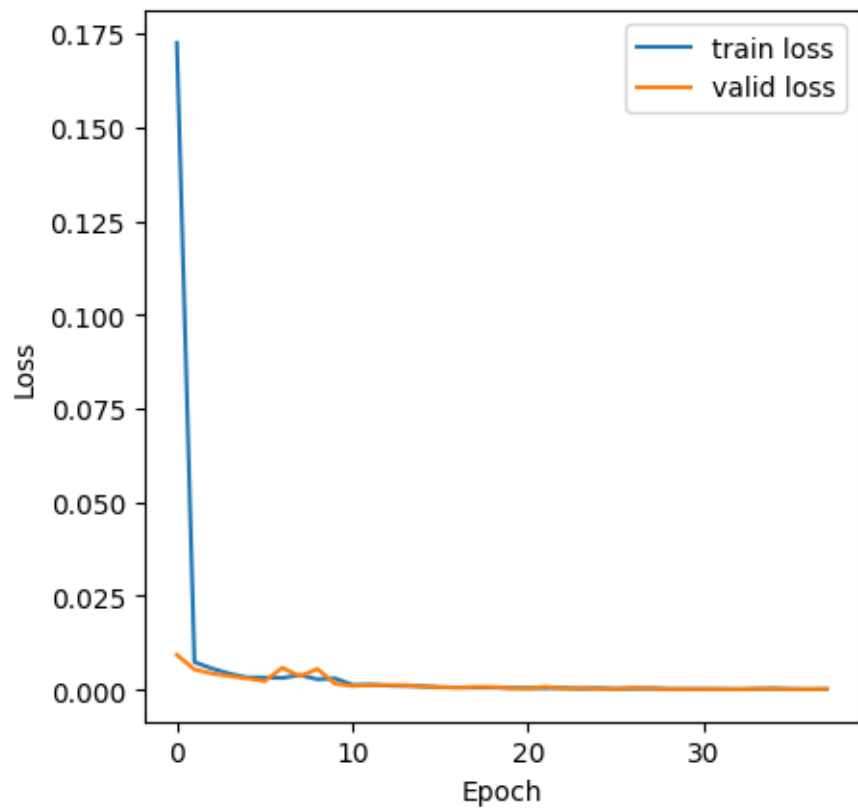
```
using: 1 temperature_230509_discrete
EARLY STOPPING @ epoch 20
min train loss: 0.00012273731265326427
min valid loss: 0.00015751682803966105
```
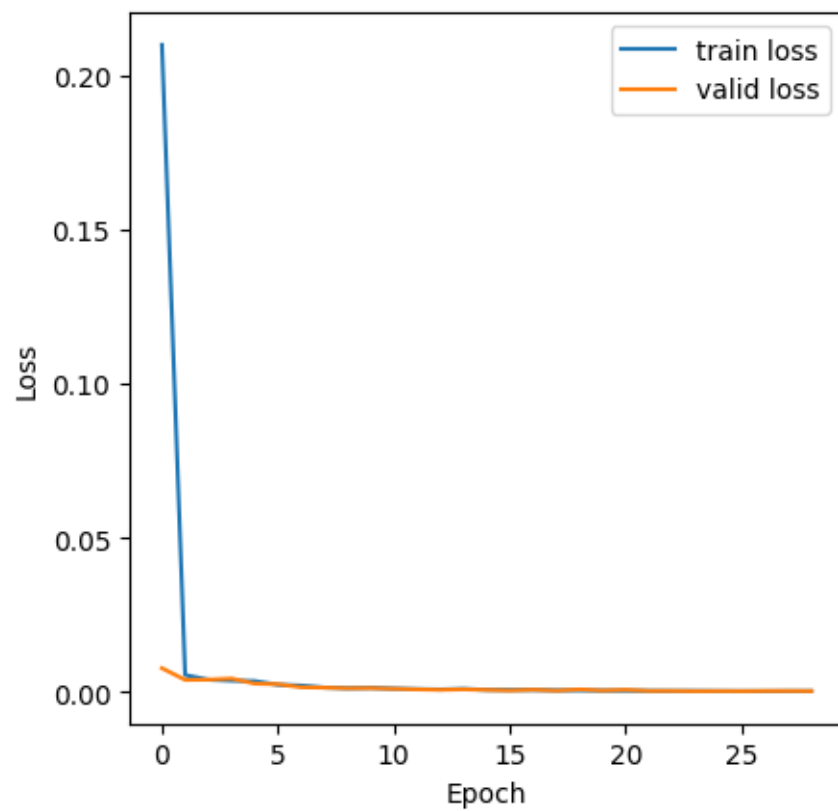
```
CV round 12_____
using: 0 pressure_230516_discrete
EARLY STOPPING @ epoch 38
min train loss: 0.00011263490536789917
min valid loss: 0.00011570999868126819
```
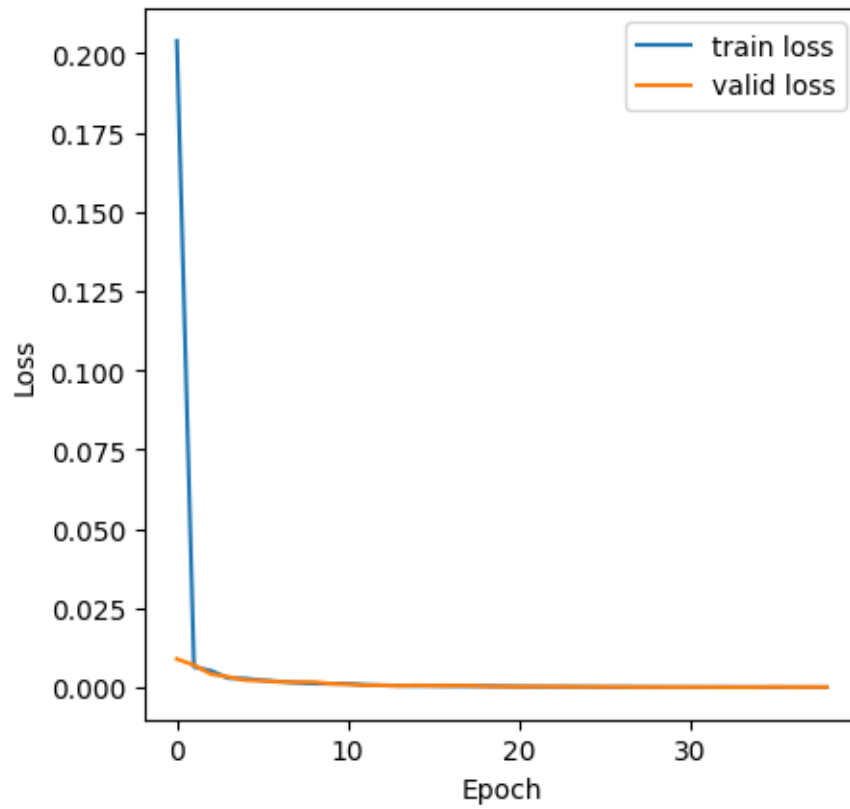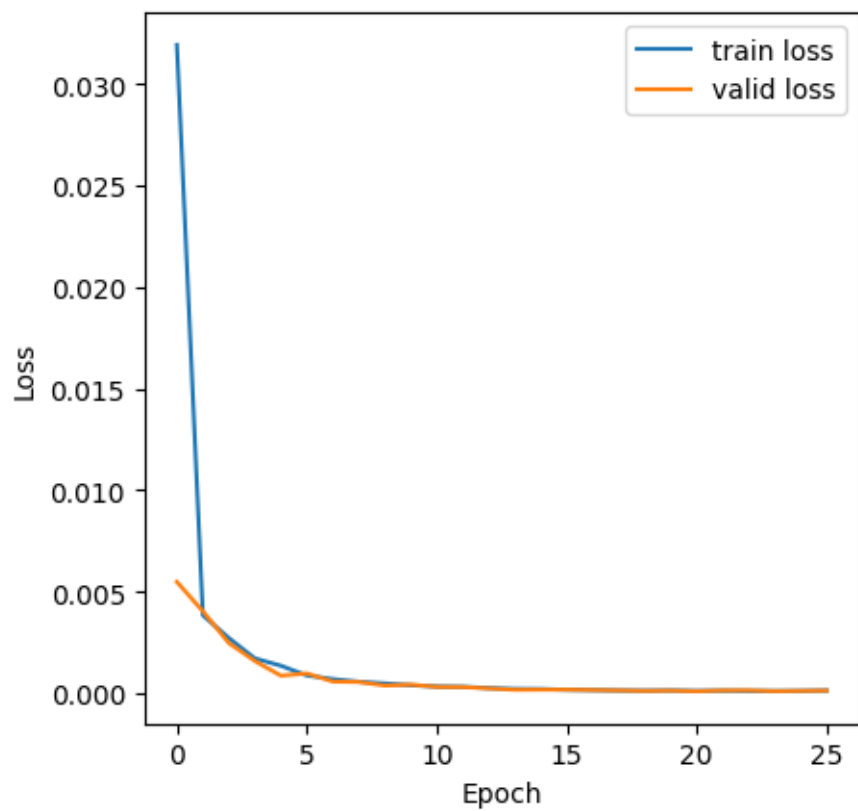
```
using: 1 temperature_230509_discrete
EARLY STOPPING @ epoch 28
min train loss: 0.00012487181265896652
min valid loss: 0.00013480027628247625
```
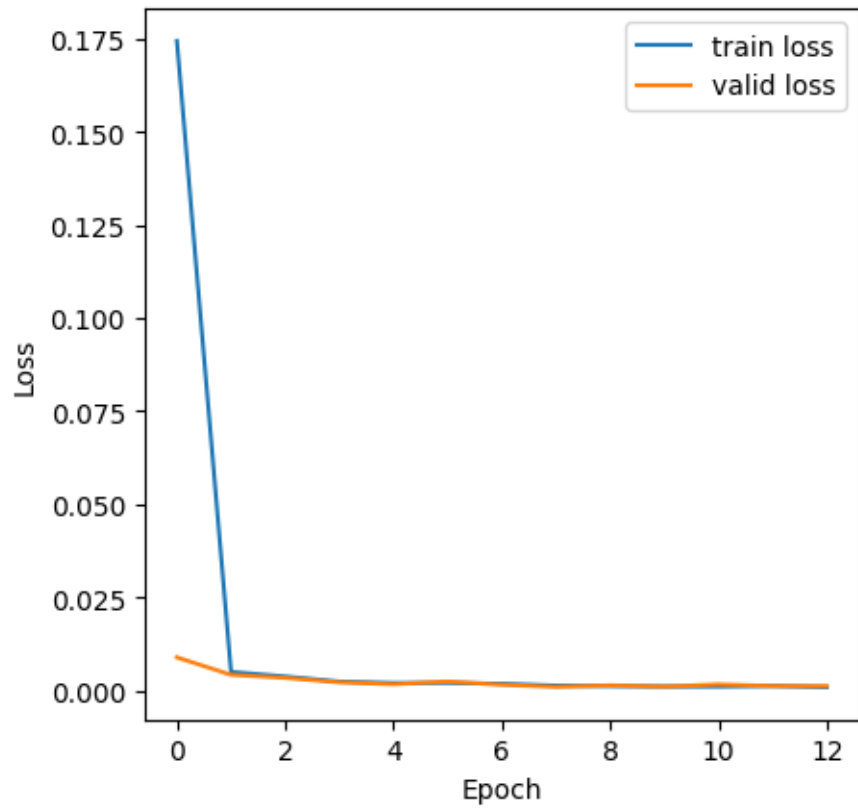
```
CV round 13_____
using: 0 pressure_230516_discrete
EARLY STOPPING @ epoch 28
min train loss: 0.00021724712569266656
min valid loss: 0.00023935511489980854
```
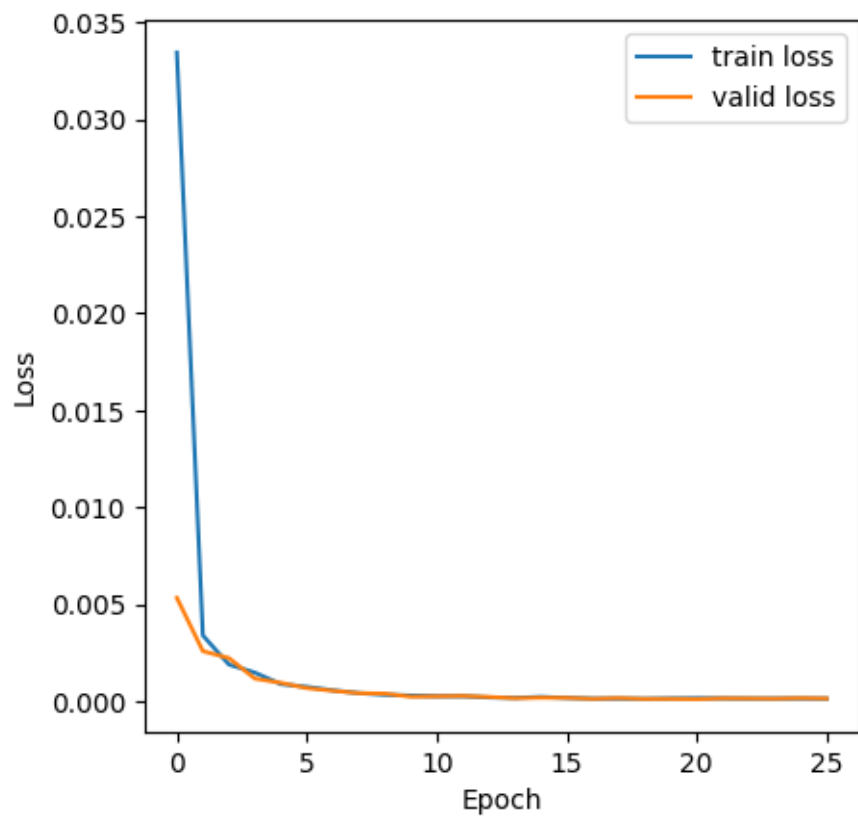
```
using: 1 temperature_230509_discrete
EARLY STOPPING @ epoch 25
min train loss: 0.00010569988940419121
min valid loss: 9.435563842998817e-05
```
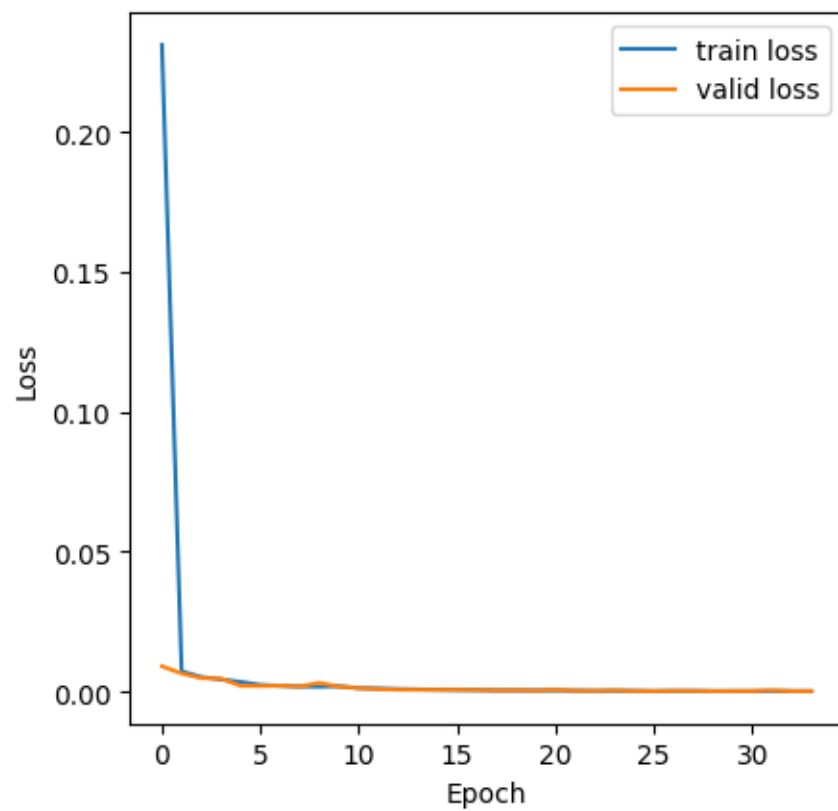
```
CV round 14_____
using: 0 pressure_230516_discrete
EARLY STOPPING @ epoch 12
min train loss: 0.0008790650436739353
min valid loss: 0.0009785950751393102
```

```
using: 1 temperature_230509_discrete
EARLY STOPPING @ epoch 25
min train loss: 0.00012653327647774748
min valid loss: 0.00010675186349544674
```

```
CV round 15_____
using: 0 pressure_230516_discrete
EARLY STOPPING @ epoch 33
min train loss: 0.0001560293130089783
min valid loss: 0.00015030027861939743
```

```
using: 1 temperature_230509_discrete
EARLY STOPPING @ epoch 29
min train loss: 0.00010594725129273932
min valid loss: 0.00012274601685930976
```
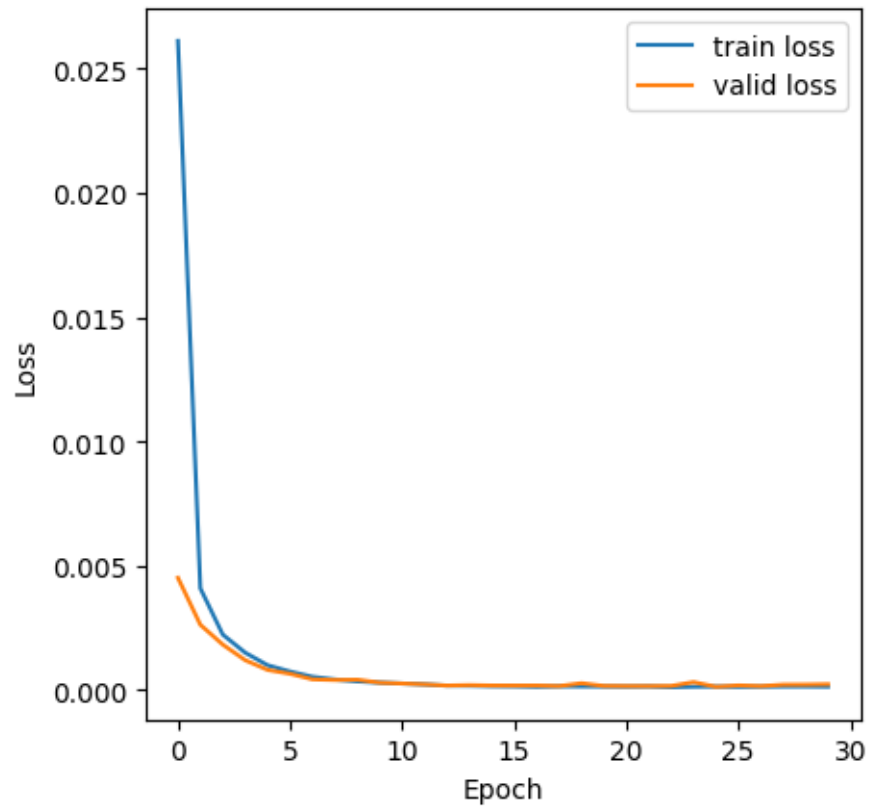
BEST model: CV=1.pth with 7.995304549694993e-05
trained datas sequentially
Aggregate performance: yo
pressure_230516_discrete: Valid loss mean 0.0001877496215740848, std
0.00021288128908109665
temperature_230509_discrete: Valid loss mean 0.00013342707272840927, std
4.250540645966947e-05
  TRAINing COMPLETE_____
TEST_____
Testing pressure_230516_discrete, loss: 3.9541343599557877
Testing temperature_230509_discrete, loss: 0.000130839669988123