

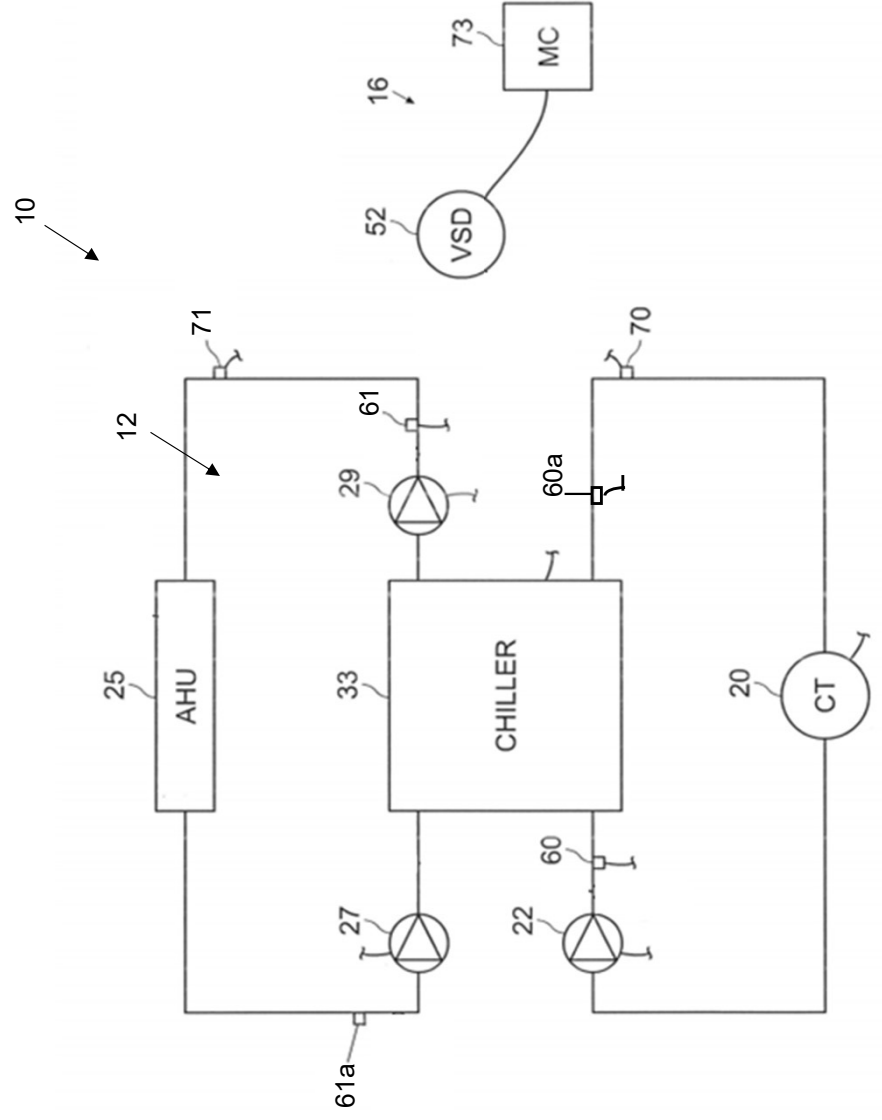


FIG. 1

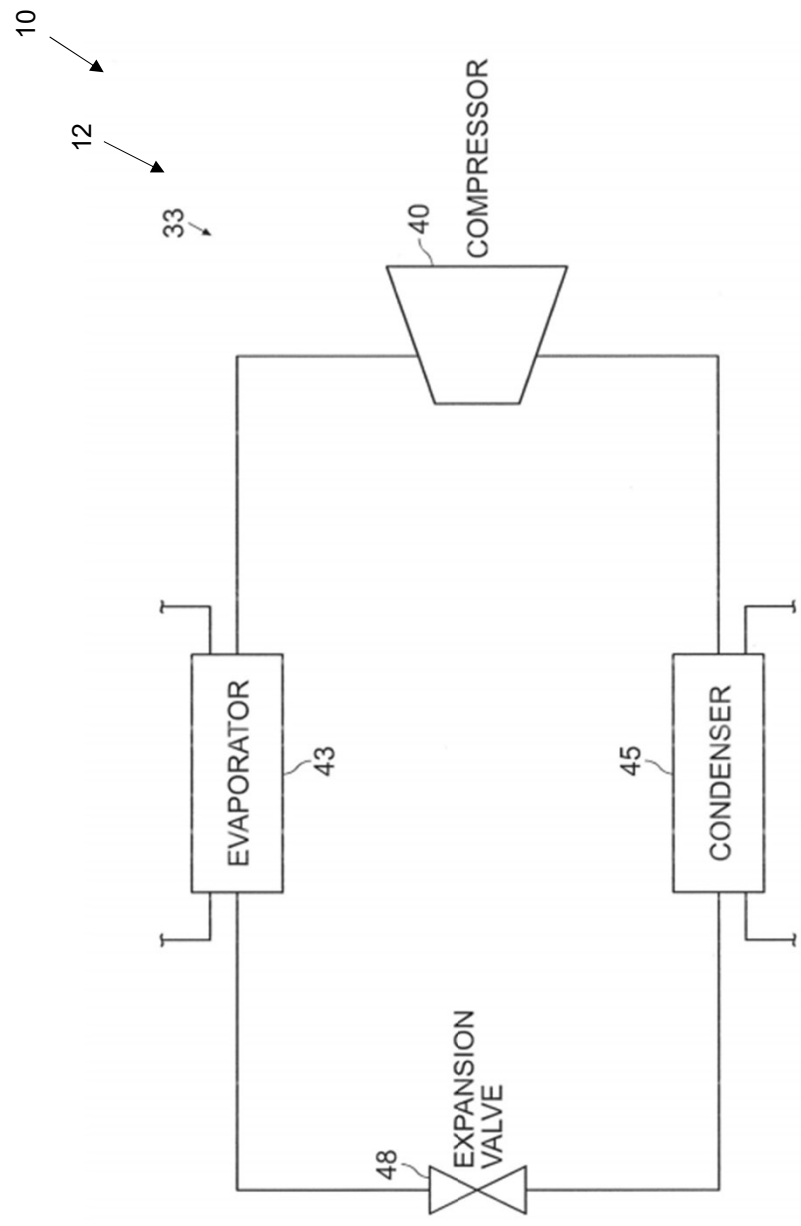


FIG. 2

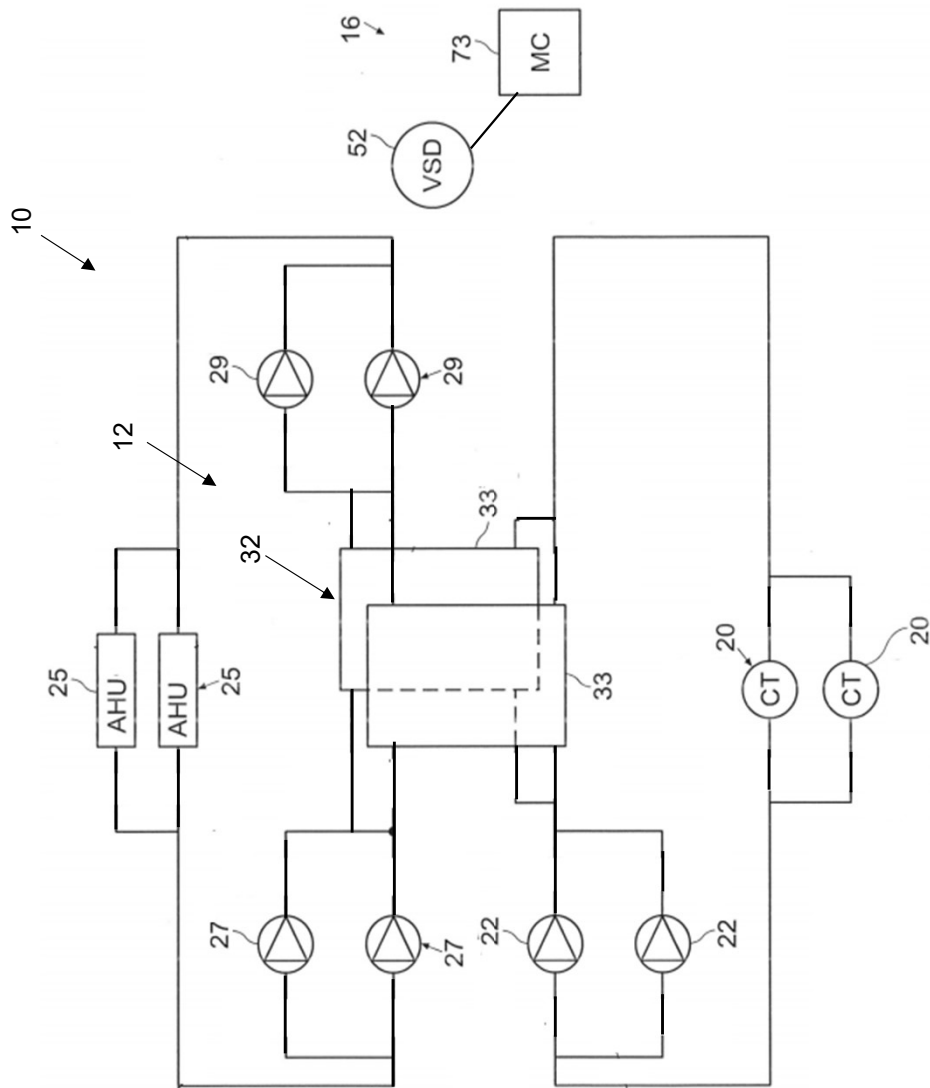


FIG. 3

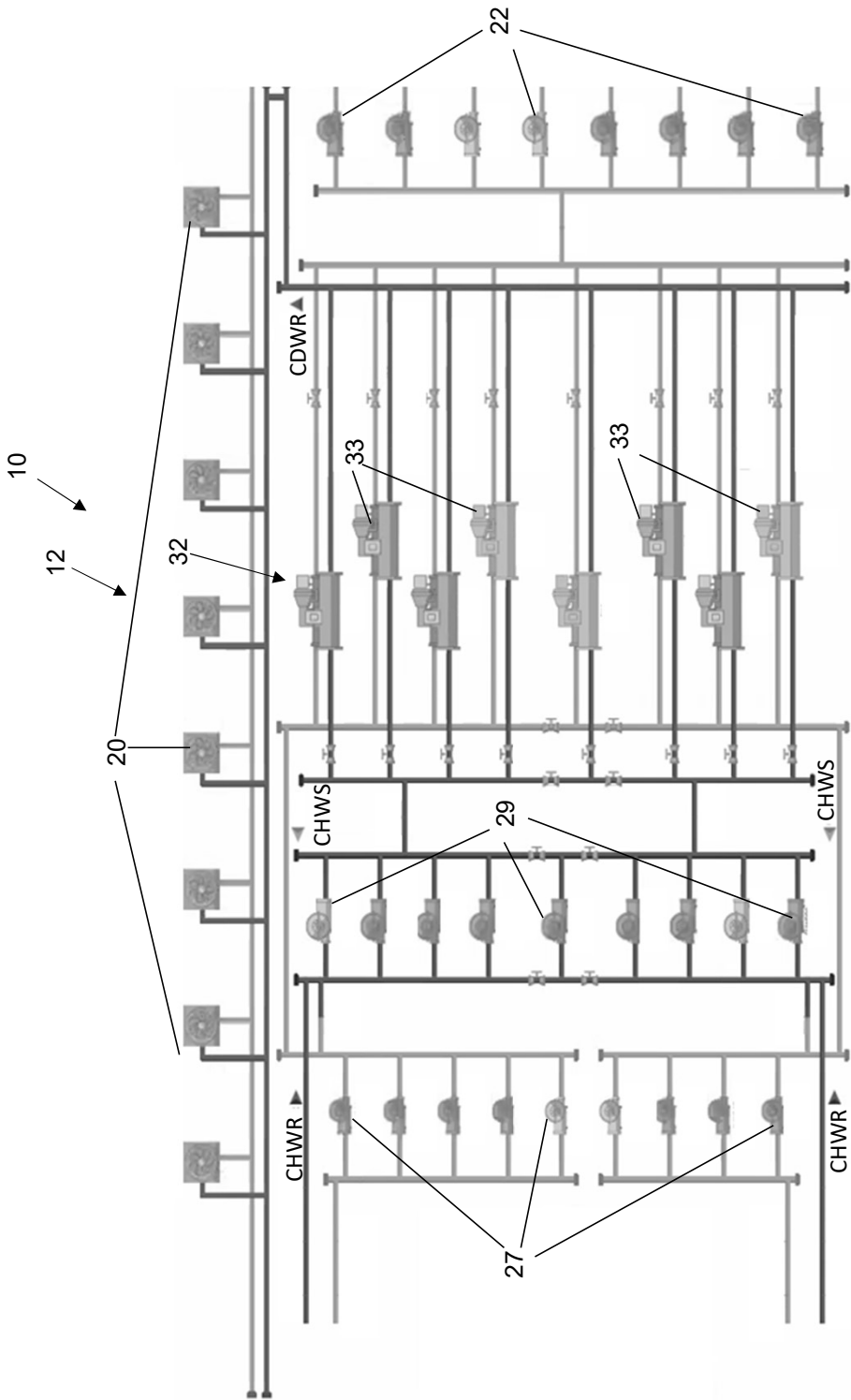


FIG. 4

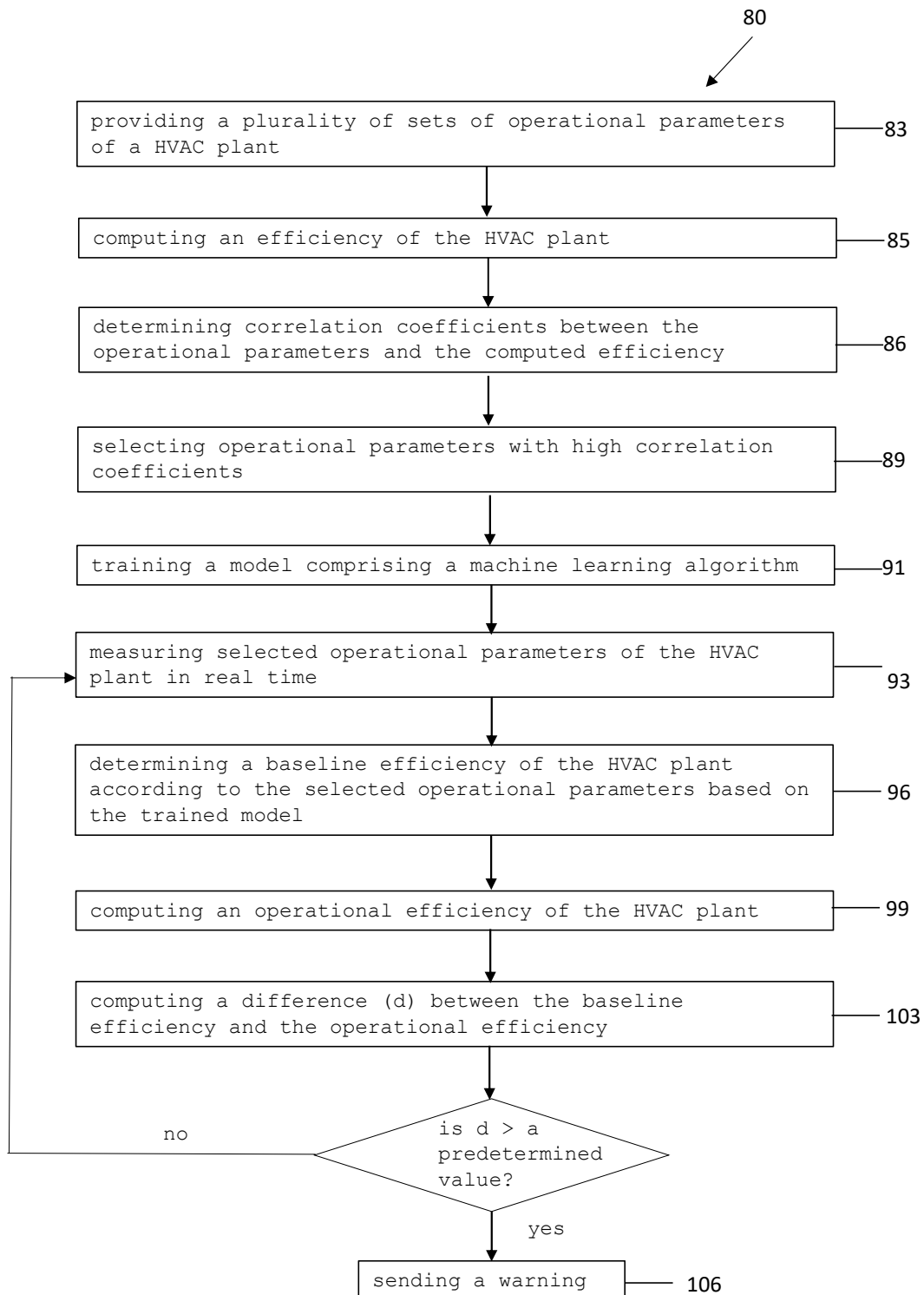


FIG. 5

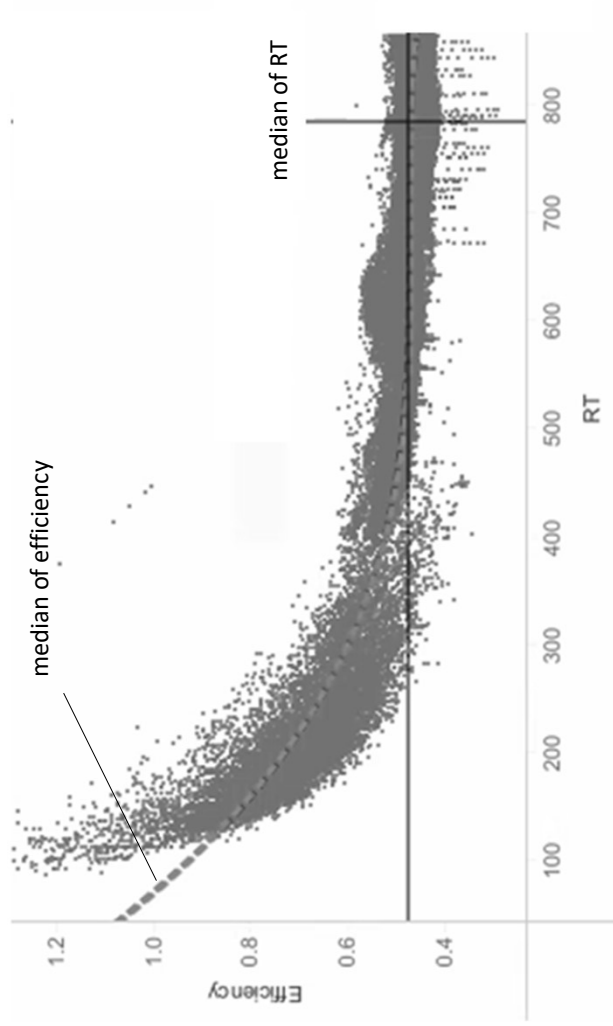


FIG. 6

Examples of operational parameters

CDWS_CH1_F	CDWP3_HZ	CDWR_CH3_T	CH_HEATADD	CH2_KWH
CDWS_CH2_F	CDWP3_KW	CDWR_CH4_T	CH_HEATREJ	CH2_MODE
CDWS_CH3_F	CDWP3_KWH	CDWR_CH5_T	CH_KW	CH2_RT
CDWS_CH4_F	CDWP3_MODE	CDWR_CT1_T	CH_RT	CH2_RUN_HRS
CDWS_CH5_F	CDWP3_ST	CDWR_CT2_T	CH1_EFF	CH2_ST
CDWS_HDR_F	CDWP3_TRIP	CDWR_CT3_T	CH1_HEATADD	CH2_TRIP
CDWS_HDR_F_SP	CDWP4_HZ	CDWR_CT4_T	CH1_HEATBAL	CH3_EFF
CDWP_KW	CDWP4_KW	CDWR_CT5_T	CH1_HEATREJ	CH3_HEATADD
CDWP1_HZ	CDWP4_KWH	CDWR_HDR_T	CH1_KW	CH3_HEATBAL
CDWP1_KW	CDWP4_MODE	CDWS_CH1_T	CH1_KWH	CH3_HEATREJ
CDWP1_KWH	CDWP4_ST	CDWS_CH2_T	CH1_MODE	CH3_KW
CDWP1_MODE	CDWP4_TRIP	CDWS_CH3_T	CH1_RT	CH3_KWH
CDWP1_ST	CDWP5_HZ	CDWS_CH4_T	CH1_RUN_HRS	CH3_MODE
CDWP1_TRIP	CDWP5_KW	CDWS_CH5_T	CH1_ST	CH3_RT
CDWP2_HZ	CDWP5_KWH	CDWS_CT1_T	CH1_TRIP	CH3_RUN_HRS
CDWP2_KW	CDWP5_MODE	CDWS_CT2_T	CH2_EFF	CH3_ST
CDWP2_KWH	CDWP5_ST	CDWS_CT3_T	CH2_HEATADD	CH3_TRIP
CDWP2_MODE	CDWP5_TRIP	CDWS_CT4_T	CH2_HEATBAL	CH4_EFF
CDWP2_ST	CDWR_CH1_T	CDWS_CT5_T	CH2_HEATREJ	CH4_HEATADD
CDWP2_TRIP	CDWR_CH2_T	CDWS_HDR_T	CH2_KW	CH4_HEATBAL
				CH4_HEAT

FIG. 7

Examples of data sets

	Chiller 1 power	Chiller 2 power	Chiller 3 power	Chiller 4 power	CHWR_F	CHWR_T	CHWS_T	Computed plant efficiency	Predicted plant efficiency	Data set
1	223	0	51	0	107.3	14.7	10.2	1.085	NA	Discard
2	59	0	107	0	74.7	11.7	8.5	0.637	NA	Discard
3	0	223	105	0	109.1	13.1	8.6	0.637	NA	Discard
4	0	0	107	0	73.6	10.9	8.3	1.196	NA	Discard
5	0	161	54	46	94	12.5	8.4	0.635	NA	training
6	196	0	40	15	95.8	12.5	8.5	0.605	NA	training
7	0	161	66	11	98.4	14.3	10.2	0.613	NA	training
8	0	196	89	0	104.5	13.1	9	0.666	NA	training
9	185	0	99	0	100.4	12.6	8.6	0.631	NA	training
10	0	0	155	0	79.9	11.4	8.4	0.607	NA	training
11	0	0	140	0	76.9	11.1	8.4	0.65	NA	training
12	0	0	161	0	79.9	11.6	8.5	0.356	NA	training
13	0	0	121	0	74.9	10.7	8.4	0.697	NA	training
14	0	0	105	0	73	10.4	8.6	0.466	0.463	testing
15	48	195	15	0	102.3	12.2	8.6	0.672	0.664	testing
16	28	212	91	0	123.9	14.3	10.1	0.617	0.621	testing
17	0	0	161	0	79.9	11.6	8.5	0.356	0.356	testing

FIG. 8

Evaluation of trained models

Model	Mean Absolute Error	Root Mean Squared Error	Relative Squared Error	Relative Absolute Error	Coefficient of Determination	Training Duration (minutes)
Boosted-tree Regressor	0.006086	0.009099	0.07721	0.231515	0.92279	240
Linear regression model	0.007202	0.010782	0.108412	0.27394	0.891588	45
Neural Networks	0.010162	0.01544	0.222329	0.386532	0.777671	280
Random forest	0.006085	0.009329	0.081173	0.231443	0.918827	180

FIG. 9