HT2018B/C Battery System Tester

Manual V1.2

Content

1 Brief Introduction

HT2018B/C Series Battery System Tester is a performance testing tool for startup lead-acid batteries. It is a testing tool for measuring the startup process, charging process and battery performance during electric load process. HT2018C has the Bluetooth printing function for startup process test report.

This product can be used for battery production and sales, auto parts maintenance and various equipment systems related to the use of lead-acid batteries on the performance of lead-acid batteries testing tools.

Features:

- The instrument is excellent in design, easy to operate, accurate in reading and complete in functions.
- The instrument adopts large screen dot matrix liquid crystal display.
- The internal use of accurate circuits and powerful digital processing unit, using four-wire Kelvin test connection method to complete a series of complex data acquisition and operation, and obtain each test data.
- The instrument strengthens the protection of input signal line against mistake and input characteristic, so as to prevent polarity reversal, prevent high voltage connection and bad contact of test clamp head, in order to use in the process of safer and more convenient.

2 Safety Requirements

This manual includes the use of instrument instructions and safety operation warnings and how to maintain them. Using instruments without manuals may damage the instrument. This instrument is designed and manufactured strictly according to the safety requirements of GB4793.1 electronic measuring instrument and IEC/EN61010-1 safety standard. It meets the double insulation overvoltage standard CAT III 600V and pollution level 2 safety standard design.

1) HT2018B/C is suitable for detecting 6V, 12V and 24V batteries;

2) The working voltage range of HT2018B/C is DC 4.5V ~30V;

3) Battery voltage will be slightly higher than the normal value at just full state, please turn on the headlamp for 2-3 minutes, and when the voltage drops back to the normal value, now measure again;

4) Check the test fixture before use. The insulation layer is intact, no breakage, nudity and disconnection. It is forbidden to use the front cover before it is covered, otherwise it will be in danger of electric shock;

5) Don’t use and store instruments in high temperature, high humidity, inflammable, explosive and strong electromagnetic fields;

6) Please do not change the instrument's internal circuit at random, so as not to damage the instrument and safety;

7) Wear a qualified eye patch when testing or repairing cars to prevent the engine from carrying foreign matter into the eyes;

8) Please operate and repair vehicles in a well ventilated environment to prevent inhalation of toxic gases;

9) If the car engine is running, do not put the instruments and accessories beside the engine or exhaust pipe to avoid high temperature damage;

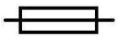
10) Pay attention to car manufacturers' warnings and precautions and maintenance procedures when repairing automobiles;

11) Selectable battery standards:

Exact test
CCA：100~1700
IEC：100~1000
EN：100~1700
DIN：100~1000
JIS：Need to check the table CCA

Quick test
3AH~250AH

3 International electrical symbols

	DC
	AC
	DC/AC
	Warning caution safety sign
	Dangerous voltage (danger of electric shock)
	GND
	Double insulated and highly insulated
	Fuse
	Battery

4 Product icons and instructions

Function keys and test forceps:

<▲> <▼>: Recurring, decreasing, up and down page keys;

<ESC>: Cancel, return key;

<ENTER>: Confirm, enter and test key.

Intermediate key: Enter the printing interface;

Red test clamp: Positive connection test clamp;

Black test clamp: Negative connection test clamp.

5 Functions

5.1 Battery voltage type

The battery tester can test 6V, 12V and 24V batteries. Voltage type can be selected after the instrument is powered on.

After the battery is connected correctly, the battery startup capability test, startup load test, maximum load test and charging system test can be selected.

5.2 Battery Test

Quick Test

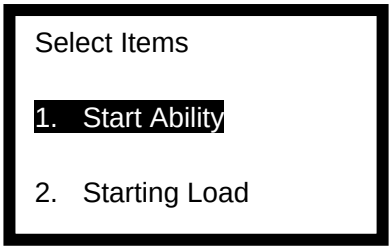
5.2.1 Preparation before testing

- If the car is in motion, please turn off the fire and turn the key to OFF position.
- When the vehicle is running at one end of the road, the battery is just full, and the voltage will be slightly higher than the normal value. Please turn on the headlight for 2-3 minutes, and when the voltage drops back to the normal value, now measure again.

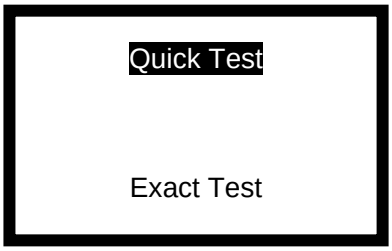
5.2.2 Operation

1) Connect the red test clamp to the battery positive pole; connect the black test clamp to the battery negative pole. Attention must be made to good contact so as not to affect test results.

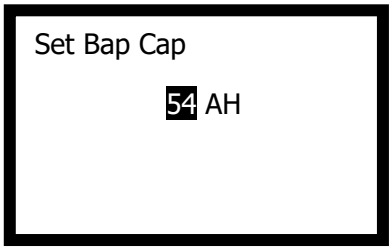
2) Press <▲> <▼> button to select the battery startup ability test item and press <ENTER> to enter the selection, as follows:



3) According to the nameplate on the battery, press <▲> <▼> button to select the quick test or exact test. Select Quick Test here and press <ENTER> to proceed to the next step.

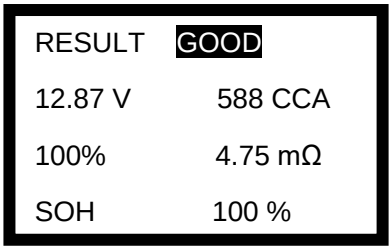


4) According to the battery capacity value, press <▲> <▼> button to adjust the battery capacity value, as shown in the figure.



5) Adjust the reference standard value of battery test and press the <ENTER> button to start the test.

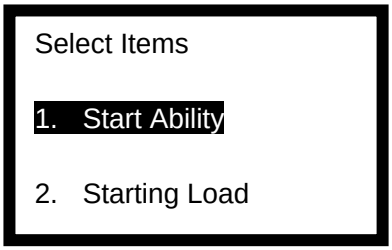
6) When the test is completed, and the display area will display the test results.



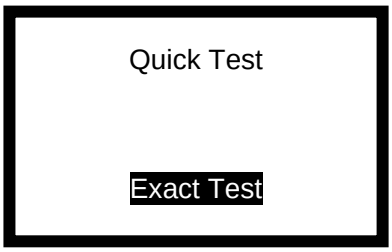
Exact Test

1) Connect the red test clamp to the battery positive pole, connect the black test clamp to the battery negative pole. Attention must be made to good contact so as not to affect test results.

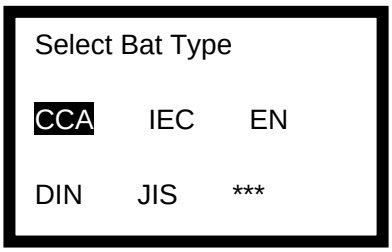
2) Press <▲> <▼> button to select the battery startup ability test item and press <ENTER> to enter the selection, as follows:



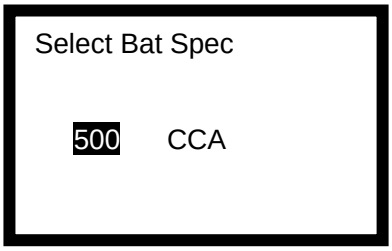
3) According to the nameplate on the battery, press <▲> <▼> button to select the quick test or exact test. Select Exact Test here and press <ENTER> to proceed to the next step.



4) According to the battery standard and press <▲> <▼> button to choose the battery type. If the battery is JIS standard, select CCA (SAE) as the test standard after consulting the table and comparing CCA. After choose the battery type, now press <ENTER> to enter the selection, as follows:

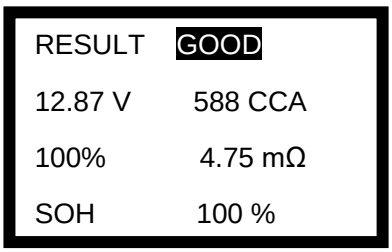


5) According to the standard value expressed on the battery, pressing <▲> <▼> button to adjust the battery specification, and long press <▲> <▼> button to realize the numerical adjustment. As follows:



6) Adjust the reference standard value of battery test and press the <ENTER> button to start the test.

7) When the test is completed, and the display area will display the test results.

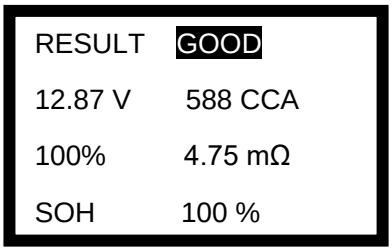


8) Now press the middle button to enter the print test report interface (refer to Section 5.6), press the < ESC > button will return to step (4).

Note: only HT2018C has Bluetooth printing function.

5.2.3 Battery test results instruction

1) The normal test result



Battery voltage 12.85V

Full power	100%	12.78V
	75%	12.54V
	50%	12.30V
	25%	12.12V
Fully discharged		11.94V

CCA value 588CCA

- The test to determine the state of the battery.
- When testing 24V battery, CCA is 1/2 of the sum of the two 12V batteries in series.

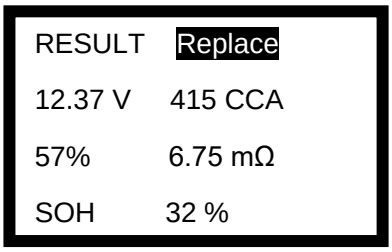
Internal resistance 4.75mΩ

- The battery CCA value is greater, the resistance will be smaller in general.
- The internal resistance of the standard is different because of different materials battery, so there is no certain standard. But the same type of battery with the same manufacturer does not differ greatly in resistance out of the factory.
- When testing 24V battery, the internal resistance is the resistance sum of the two 12V batteries in series.

Life Show the usage state of the battery. It is recommended to replace the battery when the life of the battery is less than 45%.

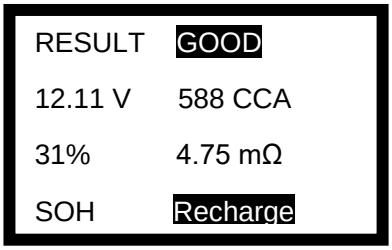
Life	Test Result	Comment
＞80%	Good	The battery is in good condition.
＞60%	Common	The battery condition is acceptable.
＞45%	Attention	Battery will be exhausted. Pay attention.
＜45%	Replace	Battery is exhausted. Please replace it.

2) Replace



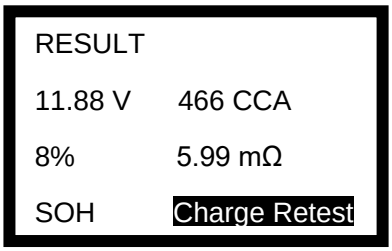
The test result shows that the battery life is only 32%, and the performance is poor. Recommended to replace.

3) Life is normal and voltage is low



The test result shows that the battery life is 100% and the performance is excellent, but the battery voltage is only 12.11V. Recommended to charge.

4) Life is normal and voltage is too low



The test result shows that the battery voltage is only 11.88V, battery voltage is too low. That may affect the test results. It is recommended to test again after charging.

5.3 Startup Load Test

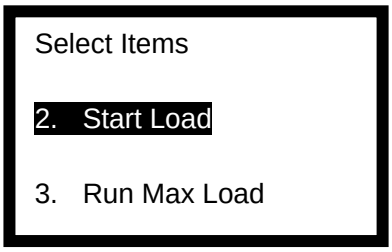
5.3.1 Preparation before testing

If the car is in motion, please turn off the fire and turn the key to OFF position.

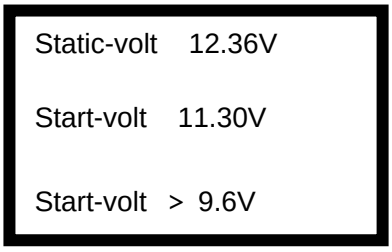
5.3.2 Operation

1) Connect the red test clamp to the battery positive pole, connect the black test clamp to the battery negative pole. Attention must be made to good contact so as not to affect test results.

2) Press <▲> <▼> button to select Start Load Test, and press <ENTER> to enter the selection, as follows:



3) The test result will be displayed as follows:



The diagram respectively shows the current test voltage (static voltage) is 12.36V, the standard voltage is 9.6V (for 6V system, the standard voltage is 4.8V; for 24V system, the standard voltage is 16V), and the lowest start-up voltage is 12.30V during startup.

4) Start the car, the tester will automatically test and record the minimum voltage that the battery output during starting the car.

5) Press the < ESC > button will return to step (2).

5.3.3 Start load test results instruction

- If the lowest voltage is greater than 9.6V (for 6V systems, voltage is greater than 4.8V; for 24V systems, voltage is greater than 16V), the startup system is good.
- If the minimum voltage is less than 9.6V (for 6V systems, voltage is less than 4.8V; for 24V systems, voltage is less than 16V), the startup system is problematic. Please check the relevant parts such as connection points, wires, starters, and whether there is rust at the battery terminals.

Data reference table (12V system)		
Startup voltage	battery discharge performance	Treatment
Above 10.7V	Good	need to observe
10.2~10.7V	Common	need to observe
9.6~10.2V	Bad	need to be replaced recently
Below 9.6V	Very Bad	need to be replaced immediately

5.4 Maximum Load Test

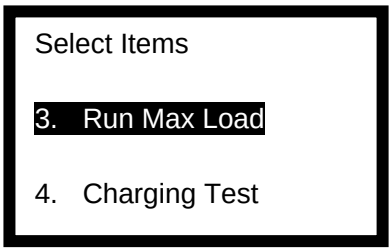
5.4.1 Preparation before testing

If the car is flameout, please start the car.

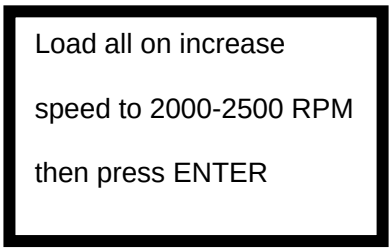
5.4.2 Operation

1) When the car is in the starting state, connect the red test clamp to the battery positive pole, and connect the black test clamp to the battery negative pole. Attention must be made to good contact so as not to affect test results.

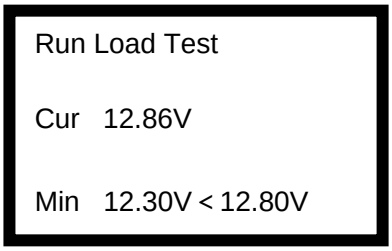
2) Press <▲> <▼> button to select Maximum Load Test, as follows:



3) Press <ENTER> to enter, The instrument will show the following picture:



4) According to the prompt in the Step 3 to operate, and press <ENTER> to enter. The test result will be displayed as follows:



The tester respectively shows the current voltage 12.86V, the standard voltage is 12.80V (for 6V system, the standard voltage is 6.40V; for 24V system, the standard voltage is 25.60V), and the minimum voltage is 12.30V.

5) The lowest voltage. If the voltage is greater than 12.8V (for 6V system, the voltage is greater than 6.40V; for 24V system, the voltage is greater than 25.60V), the system is normal.

6) Press the < ESC > button will return to step (2).

5.4.3 System problematic

If the voltage is less than 12.8V (for 6V system, the voltage is less than 6.40V; for 24V system, the voltage is less than 25.60V), please check whether the generator belt is worn out and can not be used, and whether the wire is short-circuit.

5.5 Charging System Test

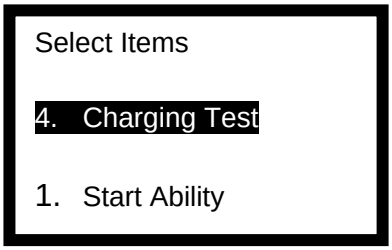
5.5.1 Preparation before testing

If the car is flameout, please start the car.

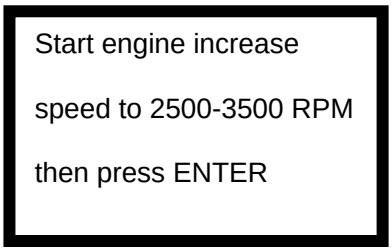
5.5.2 Operation

1) When the car is in the starting state, connect the red test clamp to the battery positive pole, and connect the black test clamp to the battery negative pole. Attention must be made to good contact so as not to affect test results.

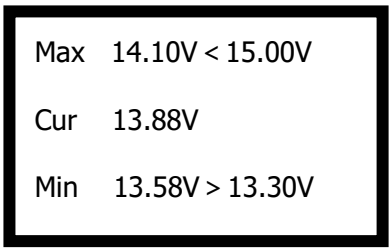
2) Press <▲> <▼> button to select Charging System Test, as follows:



3) Press <ENTER> to enter, The instrument will show the following picture:



4) According to the prompt in the Step 3 to operate, and press <ENTER> to enter. The test result will be displayed as follows:



The current voltage is 13.88V, the standard maximum voltage is 15.00V (for 6V system, the standard maximum voltage is 7.50V; for 24V system, the standard maximum voltage is 30.00V), and the maximum voltage is 14.10V.
The current voltage is 13.88V, the standard minimum voltage is 13.30V (for 6V system, the standard minimum voltage is 6.6V; for 24V system, the standard minimum voltage is 26.60V), and the minimum voltage is 13.58V.

5) Press the < ESC > button will return to step (2).

5.5.3 Charging system problematic

- If the voltage is greater than 15.0V (for 6V system, the voltage is greater than 7.50V; for 24V system, the voltage is greater than 30.00V), please check the voltage regulator.
- If the voltage is less than 13.3V (for 6V system, the voltage is less than 6.6V; for 24V system, the voltage is less than 26.60V), please check the connection point, wire and dynamotor.

Data reference table (12V system)		
status	Battery voltage	engine performance
No headlight and air cooler (need to step on the accelerator to test)	Above 13.5	Normal
	13.2~13.5	Common
	13.0~13.2	Attention
	Below 13	Need to examine and repair immediately
Turn on headlight and air conditioner (need to step on the accelerator to test)	13.4~14.6	Normal
	13.2~13.4	Common, attention
	Below 13.2	Need to examine and repair immediately
The above data are for reference. If there is any problem of battery, the data will also be affected.		

5.6 Print Test Report

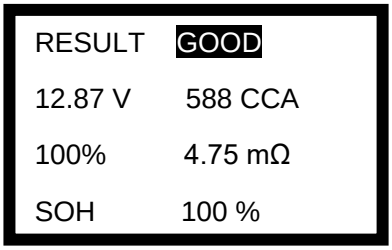
HT2018C battery tester has the kinetic energy to print test report, for recording and checking test results. You need to connect with the Bluetooth printer to the tester for print.

Note: Bluetooth printer is optional, the user can purchase from our company or find other ways to buy.

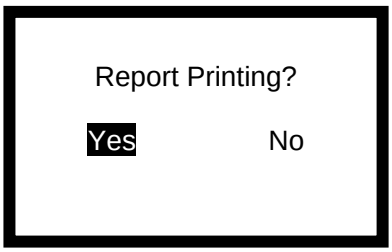
The matching printer models are: XINYE XP-58IIH Bluetooth printer and Hejie XM-NAP-1 CB58B Bluetooth printer.

Operation:

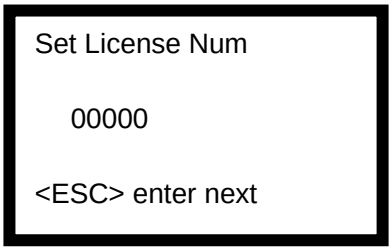
1) After the instrument test in battery startup test, the screen stays at the following interface.

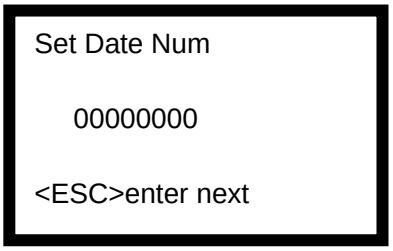


2) Now press the middle button to enter the inquiry “Print the test report?” Press the <ENTER> button to print or press the <ESC> button to exit.



3) Then prompt to enter the license plate number, test date / number. If you do not need to record, press the <ESC> button to skip.





4）After setting up, press <ENTER> or <ESC> button to print.

5) After printing, the instrument will return to battery startup test.

5.7 Language

Press <ESC> and <ENTER> two buttons at the same time and power up. Or after power up, and press <ESC> and <ENTER> two buttons more than one second. The device will enter the language switching interface. Press <▲> <▼> button to select language, then press <ENTER> button to enter the test interface, or press <ESC> button to exit.

6 The common problems

6.1 The measurement principle of the tester

As time goes on, the battery will gradually aging. The main reason is that the surface of the battery plate is aging and no effective chemical reactions can be carried out. This is the main reason why most batteries can not continue to use. The International Association of Electrical and Electronic Engineers (IEEE) formally takes the conductance test method as one of the testing standards for lead-acid batteries. In IEEE standard 1118-1996, it is clearly stated that "the measurement of battery conductance is to add the AC signal with known frequency and amplitude to both ends of the battery, and then measure the produced alternating current. AC conductance is the ratio of AC current (that has the same phase with AC voltage) to AC voltage. This product is based on such a judgment basis and developed.

6.2 The reverse current is installed on the vehicle, will it affect the test result?

All inverse currents will affect the test results of the instrument, so please remove the reverse current to measure to ensure the accuracy of the test result.

6.3 Can this product accurately predict when the battery will fail?

The internal resistance of sealed lead-acid batteries is complex, which includes ohmic internal resistance, concentration polarization internal resistance, electrochemical reaction internal resistance and the interference effect of double-layer capacitor charging. The composition and the relative content in the internal resistance values measured by different methods and at different times are different. So The measured internal resistance values are also different. There is no strict mathematical relationship between the internal resistance (or conductance) of sealed lead-acid batteries and the capacity of batteries. It is impossible to predict the service life of batteries according to the internal resistance (or conductance) of a single battery. However, the sudden increase in internal resistance or sudden decrease in conductance indicates that the battery life is about to end.

6.4 Is the CCA measured by this product correct?

CCA is a control standard for battery production. The cumulative results show that the CCA value measured by the new battery will be higher than the labeled value (10-15%). With the user's use, the CCA value will be closer to the labeled value, and then the CCA value will be lower than the labeled value.

6.5 The difference between the product test method and the load test method

Load test method: According to the physical formula R = V / I, the test equipment allows the battery to force a large constant DC current (currently used 40A ~ 80A high current) in a short time (usually 2 ~ 3 seconds), measure the voltage at both ends of the battery, and calculate the current battery internal resistance according to the formula.

This method has obvious shortcomings:

1) Only large-capacity batteries or storage batteries can be measured, and small-capacity batteries cannot load 40A-80A high current in 2-3 seconds.
2) When the battery passes through a high current, the electrode inside the battery will polarize and produce polarization resistance. Therefore, the measuring time must be very short, otherwise the error of the measured internal resistance is very large.
3) The large current will damage the electrodes inside the battery.

This product measurement method: Because the battery is actually equivalent to an active resistance, so we apply a fixed frequency and a fixed current (small current) to the battery, and then sample its voltage, after rectification, filtering and a series of processing, finally calculate the internal resistance value of the battery through the arithmetic circuit.

The advantages and disadvantages of this method:

1) Using this measurement method can measure almost all batteries, including small capacity batteries. The internal resistance of notebook batteries is measured by this method.
2) Measuring with this method will not cause much damage to the battery itself.

7 Specifications

Function		Range	Model	
			HT2018B	HT2018C
Cold start current	CCA	100~1700	√	√
	IEC	100~1000	√	√
	EN	100~1700	√	√
	DIN	100~1000	√	√
	JIS	100~1700	√	√
Battery internal resistance		0.00mΩ~99.99mΩ	√	√
Battery Voltage		4.5V~30V	√	√
Print			×	√
6V, 12V, 24V battery test			√	√
Startup load test			√	√
Charging system test			√	√
Maximum load test			√	√
Prevent reverse function			√	√
LCD			√	√
The cable length			600mm	600mm
Size			143×77×28（mm）	
Weight			270g	

8 Battery Specification Table

8.1 JIS code conversion table

Model		Cold Start Current			Model		Cold Start Current		
JIS New	JIS Old		MF	CMF	JIS New	JIS Old		MF	CMF
26A17R		200			55B24RS	NT80-S6S	430	420	500
26A17L		200			55B24LS	NT80-S6LS	430	420	500
26A19R	12N24-4	200	220	264	55D26R	N50Z	350	440	525
26A19L	12N24-3	200	220	264	55D26L	N50ZL	350	440	525
28A19R	NT50-N24	250			60D23R		520		
28A19L	NT50-N24L	250			60D23L		520		
32A19R	NX60-N24	270	295		65D23R		420	540	580
32A19L	NX60-N24L	270	295		65D23L		420	540	580
26B17R		200			65D26R	NS70	415	520	625
26B17L		200			65D26L	NS70L	415	520	625
28B17R		245			65D31R	N70	390	520	630
28B17L		245			65D31L	N70L	390	520	630
28B19R	NS40S	245			70D23R	35-60	490	540	580
28B19L	NS40LS	245			70D23L	25-60	490	540	580
32B20R	NS40	270			75D23R		500	520	580
32B20L	NS40LS	270			75D23L		500	520	580
32C24R	N40	240	325	400	75D26R	F100-5	490		
32C24L	N40L	240	325	400	75D26L	F100-5L	490		
34B17R		280			75D31R	N70Z	450	540	735
34B17L		280			75D31L	N70ZL	450	540	735
34B19R	NS40ZA	270	325	400	80D23R		580		
34B19L	NS40ZAL	270	325	400	80D26L		580		
36B20R	NS40Z	275	300	360	85B60K				500
36B20L	NS40ZL	275	300	360	85BR60K				500
36B20RS	NS40ZS	275	300	360	95D31R	NX120-7	620	660	850
36B20LS	NS40ZLS	275	300	360	95D31L	NX120-7L	620	660	850
38B20R	NX60-N24	330	340	410	95E41R	N100	515	640	770
38B20RS	NT60-N24S	330	340	410	95E41L	N100L	515	640	770
38B20L	NX60-24L	330	340	410	105E41R	N100Z	580	720	880
38B20LS	NX60-24LS	330	340	410	105E41L	N100ZL	580	720	880
40B20L		330			105F51R	N100Z	580		
40B20R		330			105F51L	N100ZL	580		
42B20R		330			115E41R	NS120	650	800	960
42B20L		330			115E41L	NS120L	650	800	960
40B20RS		330			115F51R	N120	650	800	960
40B20LS		330			115F51L	N120L	650	800	960
46B24R	NS60	325	360	420	130E41R	NX200-10	800		

46B24L	NS60L	325	360	420	130E41L	NX200-10L	800		
46B24RS	NS60S	325	360	420	130F51R			800	
46B24LS	NS60LS	325	360	420	130F51L			800	
46B26R		360			145F51R	NS150	780	920	
46B26L		360			145F51L	NS150L	780	920	
46B26RS		360			145G51R	N150	780	900	1100
34B19RS	NS40ZAS	270	325	400	80D26R	NX-110-5	580	280	630
34B19LS	NS40ZALS	270	325	400	80D26L	NX110-5L	580	280	630
46B26LS		360			145G51L	N150L	780	900	1100
48D26R	N50	280	360	420	150F51R	NT200-12	640		
48D26L	N50L	280	360	420	150F51L	NT200-12L	640		
50D20R		310	380	480	165G51R	NS200	935	980	
50D20L		310	380	480	165G51L	NS200L	935	980	
50D23R	85BR60K	500			170F51R	NX250-12	1045		
50D23L	85B60K	500			170F51L	NX250-12L	1045		
50B24R	NT80-S6	390			180G51R	NT250-15	1090		
50B24L	NT80-S6L	390			180G51L	NT250-15L	1090		
50D26R	50D20R		370		195G51R	NX300-51	1145		
50D26L	50D20L		370		195G51L	NX300-51L	1145		
55D26R		355	480	500	190H52R	N200	925	1100	1300
55D23L		355	480	500	190H52L	N200L	925	1100	1300
55B24R	NX100-S6	435	420	500	245H52R	NX400-20	1530	1250	
55B24L	NX100-S6L	435	420	500	245H52L	NX400-20L	1530	1250	

8.2 DIN/EN model comparison table

Model			DIN	EN	Model			DIN	EN
52805	52815		180	240	56420	56322	88066	300	510
53517			175	300	56530	56618	56638	300	510
53520	53521	53522	150	240	56618	56619	56620	300	510
53625	53638	53836	175	300	56633	56647	56641	300	510
53646	53621	88038	175	300	56820	56821		315	540
53653	53624	53890	175	300	57024	57029		315	540
54038	54039		175	300	57113	57539		400	680
54232			175	300	57114	56821	88074	400	680
54313	54324	54464	220	330	57218	57219		420	720
54317	54312	88146	210	360	57220	57217		420	720
54437	54466	54459L	210	360	57230			380	640
54459	54434	88046	210	360	57412	57413	57412L	400	680
54469	54449	54465	210	360	57512	57513	57531	350	570
54519	54533	54612	210	360	58515	58424		450	760
54523	54524		220	300	58521	58513		320	540
54537	54545	54801	190	300	58522	58514		320	540

54551	54580		220	300	58815	58821		395	640
54533	54577	54579	220	300	58820	58515	58527	395	640
54584	54578		220	300	58827			400	640
54590			210	330	58838	58833	88092	400	680
54827			240	360	59040	59017	59018	360	600
55040	88056		265	450	59218	59219		290	480
55041	55042		220	360	59226	59215		450	760
55044	55414	88056	265	450	59514			320	540
55046			300	510	59518	59519		395	640
55056			320	540	59615	59616		360	600
55057	54827	88156	320	540	60018	30019		250	410
55068	55069	55548	220	390	60026	58811		440	720
55218			255	420	60044	60038		500	760
55414	55415	55421	265	450	60527	60528		410	680
55422	55566	55040	265	450	61017	61018		400	680
55428	55423	55427	300	510	61023	62529		450	760
55457			265	450	61047	61048		450	760
55529			220	360	62034	62038	62045	420	680
55531	55545	55559L	255	420	63013			470	680
55559	55530	88056	255	420	63545	63549		420	680
55564	55552	55563	255	420	64020	64317	64318	325	550
55564	55565	55548	255	420	64028	64035		520	760
55570	55567	55565L	255	420	64036			460	760
56012			230	390	64317	64318	64323	540	900
56048	56068	56069	250	390	65513			540	900
56049	56069	56073	250	390	65514	65515		570	900
56077	56530		300	510	67043	67045		600	1000
56091	55800		360	540	68032	68034		600	1000
56111	55048		300	540	70029	70038	70027	630	1050
56218	55092		300	510	70036	68040	68021	570	950
56219	56216		300	510	71014	71015		700	1150
56220			280	510	72512			680	1150
56225	56323		300	510	73011			740	1200
56318	56312	56311	300	510					