

BITZER Selection Software for Windows

V7.0.4

1	General.....	5
1.1	BITZER Software manual - Licence agreement	5
1.1.1	Scope of your licence.....	5
1.1.2	Limitations on editing	5
1.1.3	Renting.....	5
1.1.4	Disclaimer.....	5
1.1.5	Updates.....	5
1.2	General remark	7
1.3	Error Messages.....	7
1.4	Hint Messages (O_Hint1)	17
1.5	Hint Messages (O_Hint2)	18
1.6	Hint Messages (O_Hint3)	18
2	Semi-hermetic recipcs ("HHK")→ HHK52.DLL	20
2.1	Function Design.....	20
2.2	Function CopyDesign	21
2.3	Function Thresholds.....	25
2.4	Function CopyThresholds	26
2.5	Function TechData.....	27
2.6	Allowed values of I_Flags.....	28
2.7	Allowed values of I_OP	28
2.8	Allowed values of I_CR	29
3	2-stage semi-hermetic recipcs ("SHK")→ SHK51.DLL.....	30
3.1	Function Design.....	30
3.2	Function CopyDesign	31
3.3	Function Thresholds.....	35
3.4	Function CopyThresholds	35
3.5	Function TechData.....	37
3.6	Allowed values of I_Flags.....	37
4	Open drive recipcs ("OHK")→ OHK51.DLL	39
4.1	Function SpeedCheck.....	39
4.2	Function Design.....	39
4.3	Function CopyDesign	41
4.4	Function Thresholds.....	43

4.5	Function CopyThresholds	44
4.6	Driving motor sizes for coupling drive	45
4.7	Allowed values of I_Flags	45
4.8	Allowed values of I_CR	45
4.9	Maximum power consumption, speed limits.....	46
5	Transport compressors ("OHF") → OHF51.DLL.....	47
5.1	Function SpeedCheck.....	47
5.2	Function Design.....	47
5.3	Function CopyDesign	48
5.4	Function Thresholds.....	51
5.5	Function CopyThresholds	51
5.6	Allowed values of I_Flags	52
5.7	Allowed values of I_CR	53
5.8	Maximum torque, speed limits	53
6	Semi-hermetic screws ("HS") → HS51.DLL.....	54
6.1	Function Design.....	54
6.2	Function CopyDesign	56
6.3	Function Thresholds.....	60
6.4	Function CopyThresholds	61
6.5	Function TechData.....	62
6.6	Function LiquidTemps	63
6.7	Allowed values of I_Flags.....	64
6.8	Allowed values of I_OP	64
6.9	Allowed values of I_CR	64
7	Semi-hermetic compact screws CS(V)H- and CS(V)W-series ("CS") → HCS51.DLL.....	65
7.1	Function Design.....	65
7.2	Function CopyDesign	67
7.3	Function Thresholds.....	71
7.4	Function CopyThresholds	72
7.5	Function TechData.....	73
7.6	Function LiquidTemps	74
7.7	Allowed values of I_Flags.....	75
7.8	Allowed values of I_OP	75
8	Open drive screws ("OS") → OS50.DLL	77
8.1	Function SpeedCheck.....	77
8.2	Function Design.....	77

8.3	Function CopyDesign	79
8.4	Function Thresholds.....	83
8.5	Function CopyThresholds	83
8.6	Function TechData.....	84
8.7	Function LiquidTemps	85
8.8	Driving motor sizes for coupling drive	86
8.9	Allowed values of I_Flags.....	86
8.10	Allowed values of I_SP.....	87
8.11	Allowed values of I_OP	87
8.12	Allowed values of I_CR	87
9	Hermetic Scroll Compressors ("ESC") → ESC51.DLL	88
9.1	Function Design.....	88
9.2	Function CopyDesign	89
9.3	Function Thresholds.....	93
9.4	Function CopyThresholds	94
9.5	Function TechData.....	95
9.6	Allowed values of I_Flags.....	96
9.7	Allowed values of I_OP	96
9.8	Allowed values of I_CR	97
9.9	Allowed values of I_CC	97
10	Air-cooled condensing units ("LH") → LH52.DLL	98
10.1	Function Design.....	98
10.2	Function CopyDesign	99
10.3	Allowed values of I_Flags.....	103
10.4	Allowed values of I_Serie	104
10.5	Allowed values of I_CR	104
10.6	Allowed values of I_OP	105
11	Air-cooled condensing units 2-stage („LSH") → LLSH51.DLL	106
11.1	Function Design.....	106
11.2	Function CopyDesign	107
11.3	Allowed values of I_Flags.....	111
11.4	Allowed value of I_Serie.....	112
11.5	Allowed value of I_OP.....	112
12	Water-cooled condensers ("WV") → LWV50.DLL	113
12.1	Obligatory input data in function Design and CopyDesign.....	113
12.1.1	Condenser type given (CalcWithCapacity = 0).....	113

12.1.2	Capacity given (CalcWithCapacity = 2)	113
12.2	Function Design.....	114
12.3	Function CopyDesign	115
12.4	Function CapacityCheck	117
12.5	Function VolflowCheck	118
12.6	Allowed values of I_Flags.....	119
12.7	Allowed values of I_Medium	119
13	Compressor name plate data→BNP50.DLL	120
13.1	Function BNPMotors.....	120
13.2	Function BNPStandard	120
13.3	Function BNPCopyStandard	121
13.4	Function BNPTechData.....	122
13.5	Function BNPCopyTechData	123
13.6	Function BNPSTechData.....	124
14	Allowed values of common input variables	126
14.1	I_Typ and I_Ref	126
14.2	I_Net and I_Number, I_DS and I_Design, I_OV and I_OpVolt	126

1 General

1.1 BITZER Software manual - Licence agreement

This software manual licence agreement is a legally binding contract between you (a natural or legal person) and BITZER Kühlmaschinenbau GmbH (BITZER) concerning the use of the BITZER Software manual. By copying or using the BITZER Software manual, you agree to the terms of this licence agreement.

1.1.1 Scope of your licence

This licence agreement allows you to use the BITZER Software manual free of charge and on a non-exclusive basis.

1.1.2 Limitations on editing

The BITZER Software manual may only be used or distributed if it is complete and unaltered.

1.1.3 Renting

You are not permitted to rent out the BITZER Software manual.

1.1.4 Disclaimer

The BITZER Software manual is merely to be considered an auxiliary and is not a substitute for the necessary expertise and experience in the design of refrigeration and air conditioning systems. We strive to maintain and improve the BITZER Software manual continuously. Nevertheless, we can neither guarantee nor assure that the BITZER Software manual is free from defects.

BITZER accepts no liability of any kind for the usability of the BITZER Software manual or for its suitability for a given purpose.

All liability for direct or indirect damage or consequential damage that might be caused by the use of the manual is excluded. This does not apply to liability for injuries to life, limb or health or instances of gross negligence or intent.

1.1.5 Updates

The latest version of the manual is available on MyBitzer if you are authorized to use it:

<https://www.bitzer.de/gb/en/mybitzer/news/>

If you have any questions or suggestions, please contact:

BITZER Kühlmaschinenbau GmbH

Peter-Schaufler-Platz 1

D-71065 Sindelfingen

Tel.: +49 (0)7031 932-0

Fax: +49 (0)7031 932-147

email: bitzer@bitzer.de

1.2 General remark

The libraries are written in 32bit.

1.3 Error Messages

Result	Error Message
-1	Error with access to coefficient files
-2	Calculation not possible, probably ambient temperature too high/low.
-3	No access to refrigerant library
-4	Miscalculation in refrigerant library
-5	No access to fluid file
-7	With these values no calculation possible
-8	Internal error (out of iteration range)
-9	Incorrigible error
-10	Wrong or incomplete input
-11	Compressor type unknown or not allowed
-12	Refrigerant unknown or not allowed
-13	Power supply unknown or not allowed
-14	Minimal speed 725 RPM (2T.2-4G.2) resp. 875 RPM (6H.2-6F.2)
-15	Maximal speed 1750 RPM
-16	Operating mode unknown or not allowed for this refrigerant
-17	Compressor with this motor not available or on request
-18	Only speed 2900 or 3500 RPM allowed
-19	Condenser type unknown or not allowed
-20	Performance data for this operating point on request
-21	Compressor not designated for this refrigerant
-22	Compressor not suitable for this operating mode
-23	Out of application ranges (see Limits)! Requires 2-stage compressor
-24	Parallel compound required. Capacity with largest single compressor

-25	Choose motor 2. Performance data for motor 1 on request
-26	Choose motor 1. Performance data for motor 2 on request
-27	Choose motor 2.
-28	Choose motor 1.
-29	Out of application ranges. External oil cooling required (data on request)
-30	Out of application ranges (see Limits)! Max. condensation
-31	Out of application ranges (see Limits)! Min. evaporating
-32	Out of application ranges (see Limits)! Min. condensation
-33	Out of application ranges (see Limits)! Max. evaporating
-34	Out of application ranges (see Limits)! Requires motor 1
-35	Out of application ranges (see Limits)! Requires K model
-36	Out of application ranges (see Limits)! Requires N model
-37	Out of application ranges (see Limits)!
-38	Requires K model. Data with ECO only on request at this time.
Result	Error Message
-39	Out of application ranges (see Limits)! Choose other operating mode
-40	Suction gas superheat is too high
-41	Suction gas superheat is too low (min. 5K /9°F)
-42	Suction gas superheat is too low (min. 5K /9°F). Dew point at
-43	Useful superheat is larger than total superheat
-44	Suction gas superheat is too high! Maximum
-45	Suction gas superheat too low (min 1K /1.8°F)
-46	Suction gas superheat too low (min 1K /1.8°F). Dew point at
-48	With these values no compressor selection possible
-49	subcooling beyond tolerable range
-50	Liquid subcooling is too high
-51	Liquid temperature/ subcooling is too low
-52	Liquid temperature is too high
-53	Liquid subcooling is negative

-54	Liquid temperature is too high! Boiling point at
-55	With this refrigerant sub cooler must be chosen
-56	With this compressor no data for ECO operation available
-57	Liquid temperature in sub cooler beyond tolerable range
-58	With these values no ECO calculation possible
-59	Capacity regulator step not allowed
-60	Discharge gas temperature too low (at least 20K above condensation)
-61	Power input limit exceeded! Maximum
-62	With these values no unit selection possible
-63	Series unknown
-64	Unknown condensing unit
-65	Missing capacity data for condenser type
-66	Capacity of largest LD unit exceeded. Select high ambient temperature series.
-67	Allowed ambient temperature exceeded! Maximum
-68	Condensing temperature too low!
-69	Condensing temperature too high!
-70	Condensing temperature too low! Minimum
-71	Condensing temperature too high! Maximum
-72	Inlet temperature too high! Maximum
-73	Fouling factor beyond tolerable range
-74	With these values no condenser selection possible.
-75	Illegal number of passes
-76	Condensing capacity too high! Maximum
-77	Outlet temperature too high! Maximum
-78	Outlet temperature too low! Minimum
-79	Volume flow too high! Maximum
-80	Volume flow too low! Minimum
-81	Required water flow too low! Minimum
-82	Required water flow too high! Maximum

-83	Required condensing capacity too high
-84	Evaporating temperature too low! Minimum
-85	Evaporating temperature too high! Maximum
-86	Required condensing temperature beyond tolerable range
Result	Error Message
-87	No calculation possible. Please check condensing temperature.
-88	No calculation possible. Please check evaporating temperature.
-89	Required volume flow beyond tolerable range.
-90	Illegal cooling agent
-91	Concentration beyond 0 .. 100%
-92	Concentration too high
-93	Water freezing below 0°C / +32°F
-94	Freezing cooling agent
-95	Boiling cooling agent
-96	Water flow too low! Minimum
-97	Water flow too high! Maximum
-98	Required condenser capacity too high! Maximum
-99	Temperature difference between inlet and outlet too low!
-100	Temperature difference between inlet and outlet too high!
-101	Outlet temperature too high
-102	Temperature difference between inlet and condensation too low! Minimum
-103	Temperature difference between condensing temperature and ambient temperature too high (max. 26,5K / 47,7°F)!
-104	Temperature difference too high. Choose a larger condenser.
-105	Temperature difference between condensing temperature and ambient temperature too low!
-106	Temperature difference between cooling agent outlet and condensation too small! Minimum
-107	Temperature difference between outlet and condensation too low! Recommendation: increase flow rate
-108	Temperature difference between outlet and condensation too low! Recommendation: increase capacity
-109	Inlet temperature too low! Minimum

-110	Inlet temperature is higher than condensing temperature.
-111	Outlet temperature is higher than condensing temperature.
-112	Outlet temperature is lower than inlet temperature.
-113	Condensing temperature is lower than ambient temperature.
-114	Compressor speed too low. Minimum
-115	Compressor speed too high. Maximum
-116	Illegal or unknown motor pulley
-117	Only speed 2900 or 3500 RPM allowed
-118	Only speed 1450 or 1750 RPM allowed
-119	Max. motor size exceeded
-120	Max. motor size exceeded - if possible use coupling
-121	Illegal or unknown motor power
-122	Enclosure class unknown or not allowed
-123	Coupling not available for this combination compressor type/ enclosure class.
-124	Power absorbed too large - individual motor selection required
-125	Selected motor power is lower than actual power consumption
-126	Individual motor selection required
-127	Efficiency class unknown or not allowed
-128	Selected motor power too small
-130	Compressor capacity too low
-131	Power input limit exceeded!
-146	Oil cooler outlet too high. Reduce maximum discharge gas temperature.
Result	Error Message
-147	Oil outlet temperature after oil cooler too low. Please check discharge gas temp.
-148	No additional cooling possible. Please check use of CSH series.
-149	Out of application range. Please check use of CSH series.
-150	Liquid injection not allowed. Select external oil cooling.
-151	Out of application range. External oil cooling required.
-152	Oil separator's capacity exceeded. Parallel refrigerant circuits recommended.

-153	Selected oil separator's capacity exceeded. Larger oil separator necessary.
-154	Oil cooler's capacity exceeded. Several oil coolers necessary.
-155	Selected oil cooler's capacity exceeded. Larger or paralleling of oil cooler necessary
-156	With these values no oil cooler required
-157	Oil coolers for ammonia on request
-158	Oil separator type unknown or not allowed
-159	Oil cooler type unknown or not allowed
-160	Max. discharge gas temp. too low! Minimum 20K (36°F) above condensing temp.
-161	Max. discharge gas temp. too low! Minimum 30K (54°F) above condensing temp.
-162	Max. discharge gas temp. too high! Maximum:
-163	Oil cooler inlet temperature is lower than ambient temperature.
-164	Maximum discharge gas temperature too low!
-165	Refrigerant pressure difference beyond tolerable range
-166	Water inlet temperature too high! Maximum
-167	Air cooled oil coolers for ammonia not available
-168	The resulting suction gas temperature is too high. Please increase liquid temperature after heat exchanger.
-169	The resulting suction superheat is too high. Please increase liquid temperature after heat exchanger.
-170	Liquid receiver type unknown or not allowed
-171	No standard compressor unit for this compressor type!
-172	No standard compressor unit for vertical liquid receiver!
-173	No vertical liquid receiver for this refrigerant!
-179	Temperature difference in oil cooler too low!
-180	Number of compressors beyond tolerable range
-181	Compressors belong to different housing sizes!
-182	Illegal combination of compressor types
-190	With these values no condenser selection possible (Reynolds number <1000).
-191	With these values no condenser selection possible (Prandtl number >120).
-192	Suction gas superheat is too low (min. 2K /3.6°F). Dew point at
-193	Suction gas superheat is too low (min. 10K /18°F). Dew point at

-194	Minimum 20K suction gas superheat required, if necessary apply internal heat exchanger.
-195	The resulting suction gas temperature is too high! Maximal 20°C / 68°F
-196	The resulting suction gas temperature is too high! Maximal 50°C / 122°F
-197	Suction gas temperature is too high! Maximal 20°C/122°F
-198	Suction gas superheat is too low (min. 2K /3.6°F)
-200	Interpolation accuracy is not sufficient
-201	Too few data for calculation of coefficients
-202	Operating mode not allowed
-203	Performance data with capacity control on request.
-204	Performance data for the selected refrigerant on request.
Result	Error Message
-205	Incorrect number of compressors
-206	Out of application ranges (see Limits)! Requires HSN95 model
-210	Subprogram not realized so far.
-229	Out of application ranges (see Limits)! Requires H model
-230	Out of application ranges (see Limits)! Max. high
-231	Out of application ranges (see Limits)! Requires OSKA95 model
-232	Out of application ranges (see Limits)! Min. high
-233	Out of application ranges (see Limits)! Requires OSNA95 model
-234	High pressure lower than critical pressure
-235	Condensing temperature is higher than critical temperature
-236	Evaporating temperature is higher than critical temperature
-237	Gas cooler outlet temperature beyond tolerable range
-238	Input value is lower than triple point (-56.56°C / -69.80°F)
-239	High pressure too low. Use automatic high pressure or increase high pressure.
-240	Out of application ranges (see Limits)! Requires HSK95 model
-241	Out of application ranges (see Limits)! Requires HSK53..HSK85 model
-247	Please select power supply 60 Hz UL.
-248	UL approval for this compressor / refrigerant combination is not available yet.

-249	Select integrated or external frequency inverter!
-250	Selected frequency and or voltage for this compressor type not available.
-251	Motor winding not available for this compressor type
-252	Missing motor data
-253	Power supply for this compressor model not available
-254	Power supply for this model not available
-255	Selected frequency outside application range
-256	Performance data with frequency inverter upon request
-257	Frequency inverter operation with further capacity control is not possible!
-258	Allowed current consumption exceeded!
-259	With these values it is not possible to select a unit within the economic frequency range 55..87 Hz. Please choose standard condensing unit.
-260	With this frequency-controlled screw compressor ECO operation is not possible!
-261	Frequency not allowed! Minimum
-262	Frequency not allowed! Maximum 100%
-263	With this series operation without frequency inverter is not possible!
-264	Allowed current consumption exceeded. Reduce frequency or select larger motor version or select special voltage motor (on request).
-265	ACP type unknown or not allowed
-266	Illegal number of operating points
-267	Oil cooler outlet temperature out of tolerable range
-268	Part load step not allowed! Minimum
-269	Tandem version for this series not available
-270	Resulting oil injection temperature too high. Reduce specified discharge gas temperature. Maximum oil injection temperature
-271	Selected oil injection temperature too high. Maximum oil injection temperature
-272	Resulting discharge gas temperature too high! Maximum discharge gas temperature
-301	Temperature at inlet is below the freezing temperature of the medium
-302	Temperature at inlet exceeds boiling temperature of the medium
-303	Temperature at outlet is below the freezing temperature of the medium
Result	Error Message

-304	Temperature at outlet exceeds boiling temperature of the medium
-305	Condensing temperature has to exceed the outlet temperature by at least 0.3K.
-306	Condensing temperature exceeds critical temperature.
-310	Prandtl and Reynolds number out of valid range.
-311	Prandtl number too low.
-312	Prandtl number too high.
-313	Reynolds number too low.
-314	Reynolds number too high.
-320	Could not calculate the heat flux density. Check surface area.
-321	Heat flux density exceeds the maximal value.
-322	Heat flux density is less than the minimal value.
-323	Allowed starting current exceeded!
-324	Max. refrigerant charge in receiver exceeded
-325	Out of application ranges (see Limits)! Requires motor 2
-350	Desuperheater temperature is larger than discharge gas temperature
-351	Liquid temperature is smaller than interstage temperature
-352	Interstage pressure higher than high pressure
-353	Interstage pressure smaller than evaporating pressure
-354	Too small/too few compressors. Choose larger or more compressors
-355	Only ext. FI allowed
-356	Superheat is negative
-357	Interstage pressure too low! Minimum
-358	Interstage pressure too high! Maximum
-359	Desuperheater temperature too low! Minimum
-360	IHX superheat too high! Maximum
-361	Too large/too many compressors. Choose smaller or less compressors
-362	Number of heat exchangers not allowed
-363	The temperature difference in the heat exchanger (pinch point) is too low. Reduce the heat capacity or the outlet / inlet temperature of the fluid.
-364	Total capacity of heat recovery is too high. A maximum of 95% of the gas cooler output or condenser output can be used.

-365	The outlet temperature of the fluid must be higher than the inlet temperature.
-366	Data with ECO currently only on request.
-367	Superheat evaporator + suction line too high. Maximum
-371	Oil cooler not designated for selected ACP
-372	Inlet temperature coolant beyond tolerable range 0 .. 45 °C (32 .. 113 °F)
-373	Outlet temperature coolant beyond tolerable range. Max. temperature:
-374	Temperature difference coolant inlet and outlet < 2 K (3.6°F)
-375	Volume flow coolant < 1 m³/h (< 36,3 cfh)
-376	Keine Berechnung möglich. Eingabewerte Ölkühler überprüfen.
-377	No calculation possible. Check oil cooler input values. Reduce coolant temperatures if necessary.
-378	Unbekannte oder unzulässige Kühlsole
-500	The data is only available for selected OEM.
-501	Selected frequency inverter too small
-502	No frequency inverter available for this operating point
-503	Frequency inverter unknown or not allowed
-504	Max. allowed sea level exceeded:
Result	Error Message
-505	Invalid number of compressors
-506	No VARIPACK frequency inverter available for this compressor.
-507	Only possible in combination with parallel stage
-508	Too many/too big ejectors selected
-509	Ejector type unknown or not allowed
-510	Too few/too small ejectors selected
-511	Ejector(s) outside permissible range. Reduce medium pressure or increase number of ejectors
-512	Ejectors inadmissible for type specification
-513	Compressor mass flow too low. Increase medium pressure.
-514	Ejector calculation not possible
-515	Out of ejector application ranges (see Limits)! Min. pressure at motive nozzle
-516	Out of ejector application ranges (see Limits)! Max. pressure at motive nozzle

-517	Out of ejector application ranges (see Limits)! Min. temperature at motive nozzle
-518	Out of ejector application ranges (see Limits)! Max. temperature at motive nozzle
-519	Ejector(s) outside permissible range. Increase medium pressure or reduce number of ejectors
-600	Discharge gas temperature below condensing temperature
-601	No unique database entry found
-602	No database entry found
-603	Database not found
-9001	Accessory not selected
-9081	Recommendations of operation conditions are not explicit

1.4 Hint Messages (O_Hint1)

O_Hint1>0: Calculated with additional remarks (sum of the following values)

O_Hint1	Message
+01	Tentative Data.
+02	Additional cooling/Limitations (see limits + t. data)!
+04	Oil cooler capacity too large - individual selection required
+08	Power absorbed too large - individual motor selection required
+16	Largest compressor with less than 900 RPM.
+32	Fluid velocity > 2m/s. Be aware of erosion risks.
+64	Water speed < 1,0 m/s (Influence of dirt !).
+128	Compressor available with individual agreement with BITZER
+256	Smallest compressor type
+512	Largest compressor - partition in several units required
+1024	Smallest tandem compressor - single compressor required.
+2048	Smallest condenser type
+4096	Largest condenser type
+8192	Condensing pressure regulation?! Sufficient ventilation must be observed!
+16384	Estimated calculation
+32768	Discharge gas temperature at least 20K (36°F) above condensing temperature
+65536	* Compressor-Performance data certified by ASERCOM (see T.Data/ Notes)
+131072	Discharge gas temperature at least 30K (54°F) above condensing temperature
+262144	*Performance data of single compressors certified by ASERCOM (see T.Data/ Notes)
+524288	Higher cooling capacity with other/alternative motor version
+1048576	Attention: restricted application limits
+2097152	Coupling housing for this motor size not available
+4194304	Starting point for motor selection see T. data / Notes
+8388608	Higher oil carryover rate! Use of secondary oil separator recommended.
+16777216	Tentative data, approximate calculation for capacity regulation
+33554432	Better coefficient of performance (COP) with other/alternative motor version
+67108864	Largest single compressor - parallel compound or tandem compressor required
+134217728	Selection for direct expansion systems. Flooded systems require individual selection.
+268435456	Maximum refrigerant charge exceeded
+536870912	Receiver selection for compact systems without condensing pressure control. Precise calculation only via refrigerant charge (see notes).
+1073741824	Unit not deliverable for this operating mode

1.5 Hint Messages (O_Hint2)

O_Hint2>0: Calculated with additional remarks (sum of the following values)

O_Hint2	Message
+01	Attention: Different compressor design sizes
+02	With these values not enough capacity. Larger or additional compressors required.
+04	Since 01.07.2016, available only for regions outside European Union.
+08	Minimum 20K (36°F) suction gas superheat required, if necessary apply internal heat exchanger.
+16	Consider national standards for the use of flammable refrigerants.
+32	Selection valid for IEC motors
+64	Selection valid for NEMA motors
+128	Selected motor power is lower than Bitzer recommendation
+256	Performance data for CRII are average values which consist of performance data of two capacity steps. Detailed information on capacity control can be found in our documentation, KT-100 and KT-101.
+512	Required cooling capacity too high. Please use the standard compressors with external frequency inverter if necessary.
+1024	Consider notes in detailed resp. part load calculation!
+2048	Performance data are based on single compressors
+4096	*Power input including fan power input
+8192	Mind operating parameters. Consultation with BITZER is recommended.
+16384	Please consider design current for 70 Hz operation when using a frequency inverter! See also KP-103.
+32768	Discharge gas temperature at least 50°C (122°F)
+65536	Power consumption at compressor inlet
+131072	Power consumption at frequency inverter inlet
+262144	Discharge gas temperature at least 15K (27°F) above condensing temperature
+524288	The additional oil amount for the external oil cooling is required. Please activate the solenoid valve.
+1048576	Liquid injection unsuitable for continuous compressor operation. Application envelope approved for special applications like reversible heat pumps.
+2097152	Performance data certified by ASERCOM (see T.Data/ Notes)
+4194304	Select larger frequency inverter to use the full frequency range of the compressor
+8388608	Since 1st of July 2016 the ecodesign requirements of EU Regulation 2015/1095 apply to condensing units
+16777216	Several oil coolers necessary.
+33554432	Capacity of selected secondary oil separator exceeded
+67108864	Secondary separation step already integrated
+134217728	Selection only valid for flooded systems
+268435456	Total superheat smaller than 10K / 18°F.
+536870912	Individual coupling selection required in case of a different motor
+1073741824	Only BSE170 allowed at tc> 60°C (140°F)

1.6 Hint Messages (O_Hint3)

O_Hint2	Message
+01	Condensing unit with the selected refrigerant at medium temperature application (MT) is only intended for deliveries outside the EU. For EU suitable condensing units, see Declaration of Conformity AC-500.
+02	Condensing unit with the selected refrigerant at low temperature application (LT) is only intended for deliveries outside the EU. For EU suitable condensing units, see Declaration of Conformity AC-500.
+04	Condensing unit with the selected refrigerant is only intended for deliveries outside the EU. For EU suitable condensing units, see Declaration of Conformity AC-500.
+08	According to EU Regulation 517/2014, the refrigerants R404A and R507A are subject to special restrictions of use
+16	

O_Hint2	Message
+32	
+64	
+128	
+256	
+512	
+1024	
+2048	
+4096	
+8192	
+16384	
+32768	
+65536	
+131072	
+262144	
+524288	
+1048576	
+2097152	
+4194304	
+8388608	
+16777216	
+33554432	
+67108864	
+134217728	
+268435456	
+536870912	
+1073741824	

2 Semi-hermetic reciprocating ("HHK") → HHK52.DLL

Attention! For calculation HHK52A.DLL, HHK52B.DLL, HHK52C.DLL, BNP50.DLL, ASEREP32.DLL, BIREF32.DLL, and CO2_LIB32.DLL have to be in the same directory as HHK52.DLL.

Calling convention "stdcall" in Delphi-Pascal corresponds to "__stdcall" in C++

2.1 Function Design

Performance data for a given compressor type respectively selection of maximum two compressor types with capacity given

Exported function of HHK52.DLL: Design		
Input parameters		
I_RPath	pChar	path of refrigerant fluid files *.REF ('ASEREP')
I_NPath	pChar	path of name plate data files BNPA*.DAT
I_Flags	LongInt	preset data (see chapter 2.6)
I_Serie ¹	LongInt	compressor series (CO ₂ only) 0 = subcritical (SL series) 1 = transcritical (ECOLINE Transcritical series) 2 = subcritical (ME series) 4 = transcritical (ECOLINE+ series)
I_Mode	LongInt	calculation method: 0 = compressor (default), 1 = heat pump
I_Typ	pChar	compressor type (see chapter 13)
I_CC	LongInt	0 – reserved for future use
I_Ref	pChar	refrigerant (see chapter 13)
I_Q	Double	cooling capacity / heating capacity in kW or kBtu/h
I_T0	Double	evaporation temperature in °C or °F
I_TC	Double	condensing temperature in °C or °F I_OP=5: High pressure (transcritical) I_TC=0: Optimum high pressure is used
I_TS	Double	suction gas temperature in °C / °F or superheat in K / °F dependent on I_Flags
I_TL	Double	liquid temperature in °C / °F or sub-cooling in K / °F dependent on I_Flags I_OP=5: Gascooler outlet in °C or °F
I_TN	Double	useful superheat in K or °F
I_NET	LongInt	three-digit motor index (see chapter 13)
I_DS ²	LongInt	motor winding type: 1 = delta, 2 = star, 3 = part winding (see chapter 13)
I_OV ²	LongInt	operating voltage (see chapter 13)
I_FI	LongInt	frequency inverter: 0 = without FI, 1 = internal FI, 2 = external FI
I_FCF ³	Double	selected FI frequency in Hz
I_FCV ³	LongInt	supply voltage in V
I_FCOF ³	LongInt	supply frequency in Hz
I_FCMV ³	LongInt	0 – reserved for future use (max. output voltage in V)
I_OP	LongInt	operating mode (see chapter 2.7)
I_CR ²	Single	100/83/75/66/50/33/25/17 resp. 10..100 stepless capacity control step in %
Output parameters		
O_T1, O_T2	pChar	two selected compressor types
O_OP1, O_OP2	LongInt	operating mode (see chapter 2.7)
O_FCF1, O_FCF2 ³	LongInt	inverter frequency in Hz
O_FCFmin1, O_FCFmin2 ²	LongInt	inverter frequency of minimum capacity in Hz
O_FCFmax1, O_FCFmax2 ²	LongInt	inverter frequency of maximum capacity in Hz

Exported function of HHK52.DLL: Design		
O_Q1, O_Q2	Double	cooling capacity / heating capacity in kW or kBtu/h
O_Qmin1, O_Qmin2 ³	Double	minimum cooling capacity / heating capacity in kW or kBtu/h
O_Qmax1, O_Qmax2 ³	Double	maximum cooling capacity / heating capacity in kW or kBtu/h
O_QU1, O_QU2	Double	evaporator capacity in kW or kBtu/h
O_QN1, O_QN2 ^{4 5}	Double	cooling capacity at standard operating conditions
O_QC1, O_QC2 ⁶	Double	condenser capacity without heat rejection in kW or kBtu/h
O_QH1, O_QH2 ⁶	Double	condenser capacity minus heat rejection in kW or kBtu/h
O_P1, O_P2	Double	power consumption in kW
O_I1, O_I2	Double	current in A
O_COS1, O_COS2	Double	power factor cos PHI
O_E1, O_E2	Double	COP (dimensionless) or EER in Btu/h/W in cooling mode / in heating mode
O_EN1, O_EN2 ^{4 5}	Double	COP / EER in cooling mode at standard operating conditions
O_VG1, O_VG2	Double	geometric displacement in m ³ /h or ft ³ /h
O_M1, O_M2	Double	mass flow in kg/h or lb/h
O_TH1, O_TH2	Double	hot gas temperature (uncooled) in °C or °F
O_PC1, O_PC2	Double	transcritical: optimum high pressure
O_Hint1, O_Hint2	LongInt	hint(s) (see chapter 1.4 and 1.5)
O_Err	pChar	supplement to error message
Design	LongInt	error message (see chapter 1.3)

Declaration with Borland Delphi® since version 2009:

```

Function Design(I_RPath, I_NPath: pAnsiChar; I_Flags, I_Serie,
  I_Mode: LongInt;
  I_Typ: pAnsiChar; I_CC: LongInt; I_Ref: pAnsiChar;
  I_Q, I_T0, I_TC, I_TS, I_TL, I_TN: Double;
  I_NET, I_DS, I_OV, I_FI: LongInt; I_FCF: Double;
  I_FCV, I_FCOF, I_FCMV, I_OP: LongInt; I_CR: Single;
  Var O_T1, O_T2: pAnsiChar;
  Var O_OP1, O_OP2, O_FCF1, O_FCF2, O_FCFmin1, O_FCFmin2,
  O_FCFmax1,
  O_FCFmax2: LongInt;
  Var O_Q1, O_Q2, O_Qmin1, O_Qmin2, O_Qmax1, O_Qmax2, O_QU1,
  O_QU2,
  O_QN1, O_QN2, O_QC1, O_QC2, O_QH1, O_QH2, O_P1, O_P2, O_I1,
  O_I2,
  O_COS1, O_COS2, O_E1, O_E2, O_EN1, O_EN2, O_VG1, O_VG2,
  O_M1, O_M2,
  O_TH1, O_TH2, O_PC1, O_PC2: Double;
  Var O_Hint1, O_Hint2: LongInt;
  Var O_Err: pAnsiChar): LongInt; StdCall; External
  'HHK52.DLL';

```

2.2 Function CopyDesign

Performance data for a given compressor type respectively selection of maximum two compressor types with capacity given

Exported function of HHK52.DLL: CopyDesign		
Input parameters		
I_RPath	pChar	path of refrigerant fluid files *.REF ('ASEREP')
I_NPath	pChar	path of name plate data files BNPA*.DAT
I_Flags	LongInt	preset data (see chapter 2.6)

Exported function of HHK52.DLL: CopyDesign		
I_Serie ¹	LongInt	compressor series (CO ₂ only) 0 = subcritical (SL series) 1 = transcritical (ECOLINE Transcritical series) 2 = subcritical (ME series) 4 = transcritical (ECOLINE+ series)
I_Mode	LongInt	calculation method: 0 = compressor (default), 1 = heat pump
I_Typ	pChar	compressor type (see chapter 13)
I_CC	LongInt	0 – reserved for future use
I_Ref	pChar	refrigerant (see chapter 13)
I_Q	Double	cooling capacity / heating capacity in kW or kBtu/h
I_T0	Double	evaporation temperature in °C or °F
I_TC	Double	condensing temperature in °C or °F I_OP=5: High pressure in bara or psia I_TC=0: Optimum high pressure is used
I_TS	Double	suction gas temperature in °C / °F or superheat in K / °F dependent on I_Flags
I_TL	Double	liquid temperature in °C / °F or sub-cooling in K / °F dependent on I_Flags I_OP=5: Gascooler outlet in °C or °F
I_TN	Double	useful superheat in K or °F
I_NET	LongInt	three-digit motor index (see chapter 13)
I_DS ²	LongInt	motor winding type: 1 = delta, 2 = star, 3 = part winding (see chapter 13)
I_OV ²	LongInt	operating voltage (see chapter 13)
I_FI	LongInt	frequency inverter: 0 = without FI, 1 = internal FI, 2 = external FI
I_FCF ³	Double	selected FI frequency in Hz
I_FCV ³	LongInt	supply voltage in V
I_FCOF ³	LongInt	supply frequency in Hz
I_FCMV ³	LongInt	0 – reserved for future use(max. output voltage in V)
I_OP	LongInt	operating mode (see chapter 2.7)
I_CR ^{2 3}	Single	100/83/75/66/50/33/25/17 resp. 10..100 stepless capacity control step in %
Output parameters		
O_T1	pChar	first selected compressor type, filled with spaces on the right
O_SzT1	LongInt	length of O_T1 without spaces
O_T2	pChar	second selected compressor type, filled with spaces on the right
O_SzT2	LongInt	length of O_T2 without spaces
DesignData	TDesignData	see below
O_Hint1, O_Hint2	LongInt	hint(s) (see chapter 1.4 and 1.5)
O_Err	pChar	supplement to error message, filled with spaces on the right
O_SzErr	LongInt	length of O_Err without spaces
CopyDesign	LongInt	error message (see chapter 1.3)
Data fields of array DesignData		
O_OP1, O_OP2	LongInt	operating mode (see chapter 2.7)
O_FCF1, O_FCF2 ²	LongInt	inverter frequency in Hz
O_FCFmin1, O_FCFmin2 ²	LongInt	inverter frequency of minimum capacity in Hz
O_FCFmax1, O_FCFmax2 ²	LongInt	inverter frequency of maximum capacity in Hz
O_Q1, O_Q2	Double	cooling capacity / heating capacity in kW or kBtu/h
O_Qmin1, O_Qmin2 ²	Double	minimum cooling capacity / heating capacity in kW or kBtu/h
O_Qmax1, O_Qmax2 ²	Double	maximum cooling capacity / heating capacity in kW or kBtu/h
O_QU1, O_QU2	Double	evaporator capacity in kW or kBtu/h
O_QN1, O_QN2 ⁴	Double	cooling capacity at standard operating conditions
O_QC1, O_QC2 ⁶	Double	condenser capacity without heat rejection in kW or kBtu/h
O_QH1, O_QH2 ⁶	Double	condenser capacity minus heat rejection in kW or kBtu/h
O_P1, O_P2	Double	power consumption in kW
O_I1, O_I2	Double	current in A
O_COS1, O_COS2	Double	power factor cos PHI

Exported function of HHK52.DLL: CopyDesign		
O_E1, O_E2	Double	COP (dimensionless) or EER in Btu/h/W in cooling mode / in heating mode
O_EN1, O_EN2 ⁴	Double	COP / EER at standard operating conditions
O_VG1, O_VG2	Double	geometric displacement in m ³ /h or ft ³ /h
O_M1, O_M2	Double	mass flow in kg/h or lb/h
O_TH1, O_TH2	Double	hot gas temperature (uncooled) in °C or °F
O_PC1, O_PC2	Double	transcritical: optimum high pressure

Declaration with Borland Delphi® since version 2009:

```

Type TDesignData = Record
    O_OP1, O_OP2 : LongInt;
    O_FCF1, O_FCF2: LongInt;
    O_FCFmin1, O_FCFmin2: LongInt;
    O_FCFmax1, O_FCFmax2: LongInt;
    O_Q1, O_Q2 : Double;
    O_Qmin1, O_Qmin2: Double;
    O_Qmax1, O_Qmax2: Double;
    O_QU1, O_QU2 : Double;
    O_QN1, O_QN2 : Double;
    O_QC1, O_QC2 : Double;
    O_QH1, O_QH2 : Double;
    O_P1, O_P2 : Double;
    O_I1, O_I2 : Double;
    O_COS1, O_COS2: Double;
    O_E1, O_E2: Double;
    O_EN1, O_EN2: Double;
    O_VG1, O_VG2: Double;
    O_M1, O_M2: Double;
    O_TH1, O_TH2: Double;
    O_PC1, O_PC2: Double;
End;

Function CopyDesign(I_RPath, I_NPath: pAnsiChar; I_Flags, I_Mode:
    LongInt;
    I_Typ: pAnsiChar; I_CC: LongInt; I_Ref: pAnsiChar;
    I_Q, I_T0, I_TC, I_TS, I_TL, I_TN: Double;
    I_NET, I_DS, I_OV, I_FI: LongInt; I_FCF: Double;
    I_FCV, I_FCOF, I_FCMV, I_OP: LongInt; I_CR: Single;
    O_T1: pAnsiChar; Var O_SzT1: LongInt;
    O_T2: pAnsiChar; Var O_SzT2: LongInt;
    Var DesignData: TDesignData; Var O_Hint1, O_Hint2: LongInt;
    O_Err: pAnsiChar; Var O_SzErr: LongInt): LongInt; StdCall;
External 'HHK52.DLL';

```

Buffer variables in calling program:

```

Var
    Type1Buf, Type2Buf: AnsiString;
    ErrorBuf: AnsiString;

```

Initialization:

```
SetLength(Type1Buf, 30);
SetLength(Type2Buf, 30);
SetLength(ErrorBuf, 20);

O_T1:=@Type1Buf[1]; or: O_T1:=pAnsiChar(Type1Buf);
O_T2:=@Type2Buf[1]; or: O_T2:=pAnsiChar(Type2Buf);
O_Err:=@ErrorBuf[1]; or: O_Err:=pAnsiChar(ErrorBuf);
```

Declaration with Microsoft Visual Basic®:

```
Type TDesignData
    O_OP1 As Long
    O_OP2 As Long
    O_FCF1 As Long
    O_FCF2 As Long
    O_FCFmin1 As Long
    O_FCFmin2 As Long
    O_FCFmax1 As Long
    O_FCFmax2 As Long
    O_Q1 As Double
    O_Q2 As Double
    O_Qmin1 As Double
    O_Qmin2 As Double
    O_Qmax1 As Double
    O_Qmax2 As Double
    O_QU1 As Double
    O_QU2 As Double
    O_QN1 As Double
    O_QN2 As Double
    O_QC1 As Double
    O_QC2 As Double
    O_QH1 As Double
    O_QH2 As Double
    O_P1 As Double
    O_P2 As Double
    O_I1 As Double
    O_I2 As Double
    O_COS1 As Double
    O_COS2 As Double
    O_E1 As Double
    O_E2 As Double
    O_EN1 As Double
    O_EN2 As Double
    O_VG1 As Double
    O_VG2 As Double
    O_M1 As Double
    O_M2 As Double
    O_TH1 As Double
    O_TH2 As Double
    O_PC1 As Double
```

```
O_PC2 As Double
End Type
```

```
Declare Function CopyDesign Lib "HHK52.DLL" _
    (ByVal I_RPath As String, ByVal I_NPath As String, ByVal
    I_Flags As Long, _
    ByVal I_Serie As Long, ByVal I_Mode As Long, ByVal I_Typ As
    String, _
    ByVal I_CC As Long, ByVal I_Ref As String, ByVal I_Q As
    Double, _
    ByVal I_T0 As Double, ByVal I_TC As Double, ByVal I_TS As
    Double, _
    ByVal I_TL As Double, ByVal I_TN As Double, ByVal I_NET As
    Long, _
    ByVal I_DS As Long, ByVal I_OV As Long, ByVal I_FI As Long,
    _
    ByVal I_FCF As Double, ByVal I_FCV As Long, ByVal I_FCOF As
    Long, _
    ByVal I_FCMV As Long, ByVal I_OP As Long, ByVal I_CR As
    Single, _
    ByVal O_T1 As String, ByRef O_SzT1 As Long, _
    ByVal O_T2 As String, ByRef O_SzT2 As Long, _
    ByRef DesignData As TDesignData, _
    ByRef O_Hint1 As Long, ByRef O_Hint2 As Long, _
    ByVal O_Err As String, ByRef O_SzErr As Long) As Long
```

Buffer variables in calling program:

```
Dim O_T1 As String * 30
Dim O_T2 As String * 30
Dim O_Err As String * 20
```

2.3 Function Thresholds

Minimum and maximum condensing temperature with refrigerant and evaporation temperature given

Exported function of HHK52.DLL: Thresholds		
Input parameters		
I_Flags	LongInt	preset data (see chapter 2.6)
I_Typ	pChar	compressor type (see chapter 13)
I_CC	LongInt	0 – <i>reserved for future use</i>
I_Ref	pChar	refrigerant (see chapter 13)
I_T0	Double	evaporation temperature in °C or °F
I_FI	LongInt	frequency inverter: 0 = without FI, 1 = internal FI, 2 = external FI
I_OP	LongInt	operating mode (see 2.7)
I_CR ²	Single	100/83/75/66/50/33/25/17 <i>resp. 10..100 stepless capacity control step in %</i>
I_Range	LongInt	0: application limits of compressor 1: calculation limits without range „data on request“
Output parameters		
O_OP	LongInt	operating mode (see chapter 2.7)
O_TCmin	Double	minimum condensing temperature in °C or °F
O_TCmax	Double	maximum condensing temperature in °C or °F
O_Err	pChar	supplement to error message

Exported function of HHK52.DLL: Thresholds		
Thresholds	LongInt	error message (see chapter 1.3)

Declaration with Borland Delphi® since Version 2009:

```
Function Thresholds(I_Flags: LongInt; I_Typ: pAnsiChar; I_CC:
    LongInt;
    I_Ref: pAnsiChar; I_T0: Double; I_FI, I_OP: LongInt; I_CR:
    Single; I_Range: LongInt;
    Var O_OP: LongInt; Var O_TCmin, O_TCmax: Double;
    Var O_Err: pAnsiChar): LongInt; StdCall; External
    'HHK52.DLL';
```

2.4 Function CopyThresholds

Minimum and maximum condensing temperature with refrigerant and evaporation temperature given

Exported function of HHK52.DLL: CopyThresholds		
Input parameters		
I_Flags	LongInt	preset data (see 2.6)
I_Typ	pChar	compressor type (see chapter 13)
I_CC	LongInt	0 – <i>reserved for future use</i>
I_Ref	pChar	refrigerant (see chapter 13)
I_T0	Double	evaporation temperature in °C or °F
I_FI	LongInt	frequency inverter: 0 = without FI, 1 = internal FI, 2 = external FI
I_OP	LongInt	operating mode (see 2.7)
I_CR ²	Single	<i>100/83/75/66/50/33/25/17 resp 10..100 stepless capacity control step in %</i>
I_Range	LongInt	0: application limits of compressor 1: calculation limits without range „data on request“
Output parameters		
O_OP	LongInt	operating mode (see chapter 2.7)
O_TCmin	Double	minimum condensing temperature in °C or °F
O_TCmax	Double	maximum condensing temperature in °C or °F
O_Err	pChar	supplement to error message, filled with spaces on the right
O_SzErr	LongInt	length of O_Err without spaces
CopyThresholds	LongInt	error message (see chapter 1.3)

Declaration with Borland Delphi® since version 2009:

```
Function CopyThresholds(I_Flags: LongInt; I_Typ: pAnsiChar; I_CC:
    LongInt;
    I_Ref: pAnsiChar; I_T0: Double; I_FI, I_OP: LongInt; I_CR:
    Single; I_Range: LongInt;
    Var O_OP: LongInt; Var O_TCmin, O_TCmax: Double;
    O_Err: pAnsiChar; Var O_SzErr: LongInt): LongInt; StdCall;
    External 'HHK52.DLL';
```

Buffer variable in calling program:

```
Var
    ErrorBuf: AnsiString;
```

Initialization:

```
SetLength(ErrorBuf, 20);
O_Err:=@ErrorBuf[1]; or: O_Err:=pAnsiChar(ErrorBuf);
```

Declaration with Microsoft Visual Basic®:

```
Declare Function CopyThresholds Lib "HHK52.DLL" _
    (ByVal I_Flags As Long, ByVal I_Typ As String, ByVal I_CC As
    Long, _
    ByVal I_Ref As String, ByVal I_T0 As Double, ByVal I_FI As
    Long, _
    ByVal I_OP As Long, ByVal I_CR As Single, ByVal I_Range As
    Long, _
    ByRef O_OP As Long, ByRef O_TCmin As Double, ByRef O_TCmax
    As Double, _
    ByVal O_Err As String, ByRef O_SzErr As Long) As Long
```

Buffer variable in calling program:

```
Dim O_Err As String * 20
```

2.5 Function TechData

Technical data of compressors

Exported function of HHK52.DLL: TechData		
Input parameters		
I_Typ	pChar	compressor type (see chapter 13)
I_CC	LongInt	0 – <i>reserved for future use</i>
I_NET	LongInt	three-digit motor index (see chapter 13) I_NET = 100: 50 Hz operation, I_NET = 200 400: 60 Hz operation
Output parameters		
O_Mult	LongInt	multiplier for succeeding current and power data
O_PC	Single	maximum power consumption in kW
O_SHT	Single	50 Hz acoustic power level at high temperature conditions in dB
O_SMT	Single	50 Hz acoustic power level at middle temperature conditions in dB
O_SLT	Single	50 Hz acoustic power level at low temperature conditions in dB
TechData	LongInt	error message (see chapter 1.3)

Declaration with Borland Delphi® since version 2009:

```
Function TechData(I_Typ: pAnsiChar; I_CC, I_NET: LongInt;
    Var O_Mult: LongInt;
```

```
Var, O_PC, O_SHT, O_SMT, O_SLT: Single):
LongInt; StdCall; External 'HHK10.DLL';
```

Declaration with Microsoft Visual Basic®:

```
Declare Function TechData Lib "HHK52.DLL" _
    (ByVal I_Typ As String, ByVal I_CC As Long, ByVal I_NET As
    Long, _
    ByRef O_Mult As Long, ByRef O_PC As Single, ByRef O_SHT As
    Single, _
    ByRef O_SMT As Single, ByRef O_SLT As Single) As Long
```

2.6 Allowed values of I_Flags

Value	Constant	Meaning	
1	CalcWithIPUnits	0	SI units
		1	IP units
2	CalcWithCapacity	0	compressor type given
		2	capacity given
4	CalcWithSuperheat	0	input suction gas temperature
		4	input suction superheat
8	CalcWithUsefulSuperheat	0	ignore useful superheat
		8	input useful superheat
16	CalcWithSubcooling	0	input liquid temperature
		16	input liquid subcooling
32	CalcWithSubcooler	0	
		32	reserved
64	CalcWithSeaWater	0	
		64	reserved
128	CalcWithMiddleTemp	0	based on dew point temperatures
		128	based on mean temperatures
256	CalcWithFan	0	
		256	reserved
512	CalcWithTandem	0	only single compressors
		512	only tandem compressors (only for capacity given)
16384	CalcWithExpansion ⁷	0	standard application limits
		16384	expanded application limits
32768	CalcWithLPDrop	0	
		32768	reserved
65536	CalcWithHPDrop	0	
		65536	reserved
131072	CalcWithEcoStar	reserved for FI compressors	
		0	single compressor mode
262144	CalcWithHeatPump	131072	EcostarÖ mode
		0	
		262144	reserved

2.7 Allowed values of I_OP

0	automatic selection (standard)	
1	forced to suction gas cooling	
2	forced to VARICOOL direkt suction	(I_Ref = R22 only)
3	forced to CIC	(I_Ref in {R22, R407A, R407F} only)
4	forced to Booster	(I_Ref in {R22, R404A, R507A} only)

	forced to transcritical operation	(I_Ref = R744 (CO ₂) only)
6	forced to Refrigerant Injection (RI)	(I_Ref in {R448A, R449A} only)

2.8 Allowed values of I_CR

Compressors	CR capacity control steps (%)
2-cylinder	100
4-cylinder	100, 50
6-cylinder	100, 66, 33
8-cylinder	100, 75, 50
2×2-cylinder Tandem	100, 50
2×4-cylinder Tandem	100, 75, 50, 25
2×6-cylinder Tandem	100, 83, 66, 50, 33, 17
4FES-3..4NES-2 4JE-13..6FE-50	10..100 stepless
8GE-50..8FE-70	50..100 stepless

¹ only interpreted if capacity given

² only interpreted if type given

³ internal frequency inverter operation: parameters I_NET, I_DS, and I_OV are ignored

external frequency inverter operation: only standard motor is allowed

⁴ according to EN 12900 (20°C suction temperature, 0K liquid subcooling)

⁵ not calculated for calculation method „heat pump“

⁶ with subcooling

⁷ expanded application limits: range of allowed condensing temperatures will be expanded for 5K at the top and at the bottom of the application range - calculated data without warranty, use for interim calculations only.

3 2-stage semi-hermetic reciprocating ("SHK") → SHK51.DLL

Attention! For calculation BNP50.DLL and ASEREP32.DLL have to be in the same directory as SHK51.DLL.

Calling convention "stdcall" in Delphi-Pascal corresponds to "__stdcall" in C++

3.1 Function Design

Performance data for a given compressor type respectively selection of maximum two compressor types with capacity given

Exported function of SHK51.DLL: Design		
Input parameters		
I_RPath	pChar	path of refrigerant fluid files *.REF ('ASEREP')
I_NPath	pChar	path of name plate data files BNPA*.DAT
I_Flags	LongInt	preset data (see chapter 3.6)
I_Typ	pChar	compressor type (see chapter 13)
I_CC	LongInt	0 – reserved for future use
I_Ref	pChar	refrigerant (see chapter 13)
I_Q	Double	cooling capacity in kW or kBtu/h
I_T0	Double	evaporation temperature in °C or °F
I_TC	Double	condensing temperature in °C or °F
I_TS	Double	suction gas temperature in °C / °F or superheat in K / °F dependent on I_Flags
I_TL	Double	only operation without subcooler: liquid temperature in °C / °F or sub-cooling in K / °F dependent on I_Flags
I_TN	Double	useful superheat in K or °F
I_NET	LongInt	three-digit motor index (see chapter 13)
I_DS ⁸	LongInt	motor winding type: 1 = delta, 2 = star, 3 = part winding (see chapter 13)
I_OV ⁸	LongInt	operating voltage (see chapter 13)
I_FI	LongInt	Frequency intervter: 0=without, 2=external
I_FCF	LongInt	0 – reserved for future use (frequency in Hz)
I_FCV	LongInt	0 – reserved for future use (supply voltage in V)
I_FCOF	LongInt	0 – reserved for future use (supply frequency in Hz)
I_FCMV	LongInt	0 – reserved for future use (max. output voltage in V)
I_OP	LongInt	reserved (operating mode)
Output parameters		
O_T1, O_T2	pChar	two selected compressor types
O_OP1, O_OP2	LongInt	operating mode (always 0)
O_FCF1, O_FCF2	LongInt	inverter frequency in Hz
O_FCFmin1, O_FCFmin2	LongInt	inverter frequency of minimum capacity in Hz
O_FCFmax1, O_FCFmax2	LongInt	inverter frequency of maximum capacity in Hz
O_Q1, O_Q2	Double	cooling capacity in kW or kBtu/h
O_Qmin1, O_Qmin2	Double	minimum cooling capacity / heating capacity in kW or kBtu/h
O_Qmax1, O_Qmax2	Double	maximum cooling capacity / heating capacity in kW or kBtu/h
O_QU1, O_QU2	Double	evaporator capacity in kW or kBtu/h
O_QN1, O_QN2	Double	cooling capacity at ISO standard operating conditions
O_QC1, O_QC2 ⁹	Double	condenser capacity without heat rejection in kW or kBtu/h
O_QH1, O_QH2 ⁹	Double	condenser capacity minus heat rejection in kW or kBtu/h
O_P1, O_P2	Double	power consumption in kW
O_I1, O_I2	Double	current in A

Exported function of SHK51.DLL: Design		
O_COS1, O_COS2	Double	power factor cos PHI
O_E1, O_E2	Double	COP (dimensionless) or EER in Btu/h/W
O_EN1, O_EN2	Double	COP / EER at ISO standard operating conditions
O_VG1, O_VG2	Double	geometric displacement (LP) in m ³ /h or ft ³ /h
O_VH1, O_VH2	Double	geometric displacement (HP) in m ³ /h or ft ³ /h
O_ML1, O_ML2	Double	mass flow (LP) in kg/h or lb/h
O_MH1, O_MH2	Double	mass flow (HP) in kg/h or lb/h
O_ME1, O_ME2	Double	reserved (<i>subcooler mass flow</i>)
O_QS1, O_QS2	Double	reserved (<i>subcooler capacity</i>)
O_TI1, O_TI2	Double	intermediate temperature in °C or °F
O_PI1, O_PI2	Double	intermediate pressure in bar or psi
O_TL1, O_TL2	Double	liquid temperature in °C or °F
O_DT1, O_DT2	Double	liquid subcooling in K or °F
O_TH1, O_TH2	Double	reserved (<i>discharge gas temperature without cooling</i>)
O_Hint1, O_Hint2	LongInt	hint(s) (see chapter 1.4 and 1.5)
O_Err	pChar	supplement to error message
Design	LongInt	error message (see chapter 1.3)

Declaration with Borland Delphi® since version 2009:

```

Function Design(I_RPath, I_NPath: pAnsiChar; I_Flags: LongInt;
  I_Typ: pAnsiChar;
  I_CC: Longint; I_Ref: pAnsiChar; I_Q, I_T0, I_TC, I_TS,
  I_TL, I_TN: Double;
  I_NET, I_DS, I_OV, I_FI, I_FCF, I_FCV, I_FCOF, I_FCMV, I_OP:
  LongInt;
  Var O_T1, O_T2: pAnsiChar; Var O_OP1, O_OP2: LongInt;
  Var O_FCF1,O_FCF2, O_FCFmin1,O_FCFmin2, O_FCFmax1,O_FCFmax2:
  LongInt;
  Var O_Q1, O_Q2, O_Qmin1,O_Qmin2 , O_Qmax1,O_Qmax2 ,O_QU1,
  O_QU2,
  O_QN1, O_QN2, O_QC1, O_QC2,
  O_QH1, O_QH2, O_P1, O_P2, O_I1, O_I2, O_COS1, O_COS2, O_E1,
  O_E2,
  O_EN1, O_EN2, O_VG1, O_VG2, O_VH1, O_VH2, O_ML1, O_ML2,
  O_MH1, O_MH2, O_ME1, O_ME2, O_QS1, O_QS2, O_TI1, O_TI2,
  O_PI1, O_PI2,
  O_TL1, O_TL2, O_DT1, O_DT2, O_TH1, O_TH2: Double;
  Var O_Hint1, O_Hint2: LongInt;
  Var O_Err: pAnsiChar): LongInt; StdCall; External
  'SHK51.DLL';

```

3.2 Function CopyDesign

Performance data for a given compressor type respectively selection of maximum two compressor types with capacity given

Exported function of SHK51.DLL: CopyDesign		
Input parameters		
I_RPath	pChar	path of refrigerant fluid files *.REF ('ASEREP')
I_NPath	pChar	path of name plate data files BNPA*.DAT
I_Flags	LongInt	preset data (see chapter 3.6)
I_Typ	pChar	compressor type (see chapter 13)
I_CC	LongInt	0 – <i>reserved for future use</i>
I_Ref	pChar	refrigerant (see chapter 13)

Exported function of SHK51.DLL: CopyDesign		
I_Q	Double	cooling capacity in kW or kBtu/h
I_T0	Double	evaporation temperature in °C or °F
I_TC	Double	condensing temperature in °C or °F
I_TS	Double	suction gas temperature in °C / °F or superheat in K / °F dependent on I_Flags
I_TL	Double	only operation without subcooler: liquid temperature in °C / °F or sub-cooling in K / °F dependent on I_Flags
I_TN	Double	useful superheat in K or °F
I_NET	LongInt	power supply (see chapter 13)
I_DS ⁸	LongInt	motor winding type: 1 = delta, 2 = star, 3 = part winding (see chapter 13)
I_OV ⁸	LongInt	operating voltage (see chapter 13)
I_FI	LongInt	Frequency intervter: 0=without, 2=external
I_FCF	LongInt	0 – reserved for future use (frequency in Hz)
I_FCV	LongInt	0 – reserved for future use (supply voltage in V)
I_FCOF	LongInt	0 – reserved for future use (supply frequency in Hz)
I_FCMV	LongInt	0 – reserved for future use(max. output voltage in V)
I_OP	LongInt	reserved (operating mode)
Output parameters		
O_T1	pChar	first selected compressor type, filled with spaces on the right
O_SzT1	LongInt	length of O_T1 without spaces
O_T2	pChar	second selected compressor type, filled with spaces on the right
O_SzT2	LongInt	length of O_T2 without spaces
DesignData	TDesignData	see below
O_Hint1, O_Hint2	LongInt	hint(s) (see chapter 1.4 and 1.5)
O_Err	pChar	supplement to error message, filled with spaces on the right
O_SzErr	LongInt	length of O_Err without spaces
CopyDesign	LongInt	error message (see chapter 1.3)
Data fields of array DesignData		
O_OP1, O_OP2	LongInt	operating mode (always 0)
O_FCF1, O_FCF2	LongInt	inverter frequency in Hz
O_FCFmin1, O_FCFmin2	LongInt	inverter frequency of minimum capacity in Hz
O_FCFmax1, O_FCFmax2	LongInt	inverter frequency of maximum capacity in Hz
O_Q1, O_Q2	Double	cooling capacity in kW or kBtu/h
O_QU1, O_QU2	Double	evaporator capacity in kW or kBtu/h
O_Qmin1, O_Qmin2	Double	minimum cooling capacity / heating capacity in kW or kBtu/h
O_Qmax1, O_Qmax2	Double	maximum cooling capacity / heating capacity in kW or kBtu/h
O_QN1, O_QN2	Double	cooling capacity at ISO standard operating conditions
O_QC1, O_QC2 ⁹	Double	condenser capacity without heat rejection in kW or kBtu/h
O_QH1, O_QH2 ⁹	Double	condenser capacity minus heat rejection in kW or kBtu/h
O_P1, O_P2	Double	power consumption in kW
O_I1, O_I2	Double	current in A
O_COS1, O_COS2	Double	power factor cos PHI
O_E1, O_E2	Double	COP (dimensionless) or EER in Btu/h/W
O_EN1, O_EN2	Double	COP / EER at ISO standard operating conditions
O_VG1, O_VG2	Double	geometric displacement (LP) in m³/h or ft³/h
O_VH1, O_VH2	Double	geometric displacement (HP) in m³/h or ft³/h
O_ML1, O_ML2	Double	mass flow (LP) in kg/h or lb/h
O_MH1, O_MH2	Double	mass flow (HP) in kg/h or lb/h
O_ME1, O_ME2	Double	reserved (subcooler mass flow)
O_QS1, O_QS2	Double	reserved (subcooler capacity)
O_TI1, O_TI2	Double	intermediate temperature in °C or °F
O_PI1, O_PI2	Double	intermediate pressure in bar or psi
O_TL1, O_TL2	Double	liquid temperature in °C or °F
O_DT1, O_DT2	Double	liquid subcooling in K or °F
O_TH1, O_TH2	Double	reserved (discharge gas temperature without cooling)

Declaration with Borland Delphi® since version 2009:

```

Type TDesignData = Record
  O_OP1, O_OP2 : LongInt;
  O_FCF1, O_FCF2 : LongInt;
  O_FCFmin1, O_FCFmin2 : LongInt;
  O_FCFmax1, O_FCFmax2 : LongInt;
  O_Q1, O_Q2 : Double;
  O_Qmin1, O_Qmin2 : LongInt;
  O_Qmax1, O_Qmax2 : LongInt;
  O_QU1, O_QU2 : Double;
  O_QN1, O_QN2 : Double;
  O_QC1, O_QC2 : Double;
  O_QH1, O_QH2 : Double;
  O_P1, O_P2 : Double;
  O_I1, O_I2 : Double;
  O_COS1, O_COS2 : Double;
  O_E1, O_E2 : Double;
  O_EN1, O_EN2 : Double;
  O_VG1, O_VG2 : Double;
  O_VH1, O_VH2 : Double;
  O_ML1, O_ML2 : Double;
  O_MH1, O_MH2 : Double;
  O_ME1, O_ME2 : Double;
  O_QS1, O_QS2 : Double;
  O_TI1, O_TI2 : Double;
  O_PI1, O_PI2 : Double;
  O_TL1, O_TL2 : Double;
  O_DT1, O_DT2 : Double;
  O_TH1, O_TH2 : Double;
End;

Function CopyDesign(I_RPath, I_NPath: pAnsiChar; I_Flags: LongInt;
  I_Typ: pAnsiChar;
  I_CC: LongInt; I_Ref: pAnsiChar; I_Q, I_T0, I_TC, I_TS,
  I_TL, I_TN: Double;
  I_NET, I_DS, I_OV, I_FI, I_FCF, I_FCV, I_FCOF, I_FCMV, I_OP:
  LongInt;
  O_T1: pAnsiChar; Var O_SzT1: LongInt; O_T2: pAnsiChar; Var
  O_SzT2: LongInt;
  Var DesignData: TDesignData; Var O_Hint1, O_Hint2: LongInt;
  O_Err: pAnsiChar; Var O_SzErr: LongInt): LongInt; StdCall;
External 'SHK51.DLL';

```

Buffer variables in calling program:

```

Var
  Typ1Buf, Type2Buf: AnsiString;
  ErrorBuf: AnsiString;

```

Initialization:

```

SetLength(Type1Buf, 30);
SetLength(Type2Buf, 30)
SetLength(ErrorBuf, 20);

O_T1:=@Type1Buf[1]; or: O_T1:=pAnsiChar(Type1Buf);
O_T2:=@Type2Buf[1]; or: O_T2:=pAnsiChar(Type2Buf);
O_Err:=@ErrorBuf[1]; or: O_Err:=pAnsiChar(ErrorBuf);

```

Declaration with Microsoft Visual Basic®:

```

Type TDesignData
    O_OP1, O_OP2 As Long
    O_Q1, O_Q2 As Double
    O_QU1, O_QU2 As Double
    O_QN1, O_QN2 As Double
    O_QC1, O_QC2 As Double
    O_QH1, O_QH2 As Double
    O_P1, O_P2 As Double
    O_I1, O_I2 As Double
    O_COS1, O_COS2 As Double
    O_E1, O_E2 As Double
    O_EN1, O_EN2 As Double
    O_VG1, O_VG2 As Double
    O_VH1, O_VH2 As Double
    O_ML1, O_ML2 As Double
    O_MH1, O_MH2 As Double
    O_ME1, O_ME2 As Double
    O_QS1, O_QS2 As Double
    O_TI1, O_TI2 As Double
    O_PI1, O_PI2 As Double
    O_TL1, O_TL2 As Double
    O_DT1, O_DT2 As Double
    O_TH1, O_TH2 As Double
End Type

Declare Function CopyDesign Lib "SHK51.DLL" _
    (ByVal I_RPath As String, ByVal I_NPath As String, ByVal
    I_Flags As Long, _
    ByVal I_Typ As String, ByVal I_CC As Long, ByVal I_Ref As
    String, _
    ByVal I_Q As Double, ByVal I_T0 As Double, ByVal I_TC As
    Double, _
    ByVal I_TS As Double, ByVal I_TL As Double, ByVal I_TN As
    Double, _
    ByVal I_NET As Long, ByVal I_DS As Long, ByVal I_OV As Long,
    _
    ByVal I_FI As Long, ByVal I_FCF As Long, ByVal I_FCV As
    Long, _
    ByVal I_FCOF As Long, ByVal I_FCMV As Long, ByVal I_OP As
    Long, _
    ByVal O_T1 As String, ByRef O_SzT1 As Long, _
    ByVal O_T2 As String, ByRef O_SzT2 As Long, _
    ByRef DesignData As TDesignData, _

```

```
ByRef O_Hint1 As Long, ByRef O_Hint2 As Long, _
ByVal O_Err As String, ByRef O_SzErr As Long) As Long
```

Buffer variables in calling program:

```
Dim O_T1 As String * 30
Dim O_T2 As String * 30
Dim O_Err As String * 20
```

3.3 Function Thresholds

Minimum and maximum condensing temperature with refrigerant and evaporation temperature given

Exported function of SHK51.DLL: Thresholds		
Input parameters		
I_Flags	LongInt	preset data (see chapter 3.6)
I_Typ	pChar	compressor type (see chapter 13)
I_CC	LongInt	0 – <i>reserved for future use</i>
I_Ref	pChar	refrigerant (see chapter 13)
I_T0	Double	evaporation temperature in °C or °F
I_OP	LongInt	reserved (<i>operating mode</i>)
I_Range	LongInt	0: application limits of compressor 1: calculation limits without range „data on request“
Output parameters		
O_OP	LongInt	operating mode (always 0)
O_TCmin	Double	minimum condensing temperature in °C or °F
O_TCmax	Double	maximum condensing temperature in °C or °F
O_Err	pChar	supplement to error message
Thresholds	LongInt	error message (see chapter 1.3)

Declaration with Borland Delphi® since version 2009:

```
Function Thresholds(I_Flags: LongInt; I_Typ: pAnsiChar; I_CC:
LongInt; I_Ref: pAnsiChar;
I_T0: Double; I_OP, I_Range: LongInt;
Var O_OP: LongInt; Var O_TCmin, O_TCmax: Double;
Var O_Err: pAnsiChar): LongInt; StdCall; External
'SHK51.DLL';
```

3.4 Function CopyThresholds

Minimum and maximum condensing temperature with refrigerant and evaporation temperature given

Exported function of SHK51.DLL: CopyThresholds		
Input parameters		
I_Flags	LongInt	preset data (see chapter 3.6)
I_Typ	pChar	compressor type (see chapter 13)
I_CC	LongInt	0 – <i>reserved for future use</i>
I_Ref	pChar	refrigerant (see chapter 13)
I_T0	Double	evaporation temperature in °C or °F

Exported function of SHK51.DLL: CopyThresholds		
I_OP	LongInt	reserved (<i>operating mode</i>)
I_Range	LongInt	0: application limits of compressor 1: calculation limits without range „data on request“
Output parameters		
O_OP	LongInt	operating mode (always 0)
O_TCmin	Double	minimum condensing temperature in °C or °F
O_TCmax	Double	maximum condensing temperature in °C or °F
O_Err	pChar	supplement to error message, filled with spaces on the right
O_SzErr	LongInt	length of O_Err without spaces
CopyThresholds	LongInt	error message (see chapter 1.3)

Declaration with Borland Delphi® since version 2009:

```
Function CopyThresholds(I_Flags: LongInt; I_Typ: PAnsiChar; I_CC:
    LongInt; I_Ref: pAnsiChar;
    I_T0: Double; I_OP, I_Range: LongInt;
    Var O_OP: LongInt; Var O_TCmin, O_TCmax: Double;
    O_Err: pAnsiChar; Var O_SzErr: LongInt): LongInt; StdCall;
    External 'SHK51.DLL';
```

Buffer variable in calling program:

```
Var
    ErrorBuf: AnsiString;
```

Initialization:

```
SetLength(ErrorBuf, 20);
O_Err:=@ErrorBuf[1]; or: O_Err:=pAnsiChar(ErrorBuf);
```

Declaration with Microsoft Visual Basic®:

```
Declare Function CopyThresholds Lib "SHK51.DLL" _
    (ByVal I_Flags As Long, ByVal I_Typ As String, ByVal I_CC As
    Long, _
    ByVal I_Ref As String, ByVal I_T0 As Double, ByVal I_OP As
    Long, _
    ByVal I_Range As Long, _
    ByRef O_OP As Long, ByRef O_TCmin As Double, ByRef O_TCmax
    As Double, _
    ByVal O_Err As String, ByRef O_SzErr As Long) As Long
```

Buffer variable in calling program:

```
Dim O_Err As String * 20
```

3.5 Function TechData

Technical data of compressors

Exported function of SHK51.DLL: TechData		
Input parameters		
I_Typ	pChar	compressor type (see chapter 13)
I_CC	LongInt	0 – <i>reserved for future use</i>
I_NET	LongInt	three-digit motor index (see chapter 13) (defines motor speed)
Output parameters		
O_Mult	LongInt	multiplier for succeeding current and power data
O_PC	Single	maximum power consumption in kW
O_SHT	Single	acoustic power level at high temperature conditions in dB (always 0)
O_SMT	Single	acoustic power level at middle temperature conditions in dB (always 0)
O_SLT	Single	acoustic power level at low temperature conditions in dB
TechData	LongInt	error message (see chapter 1.3)

Declaration with Borland Delphi® since version 2009:

```
Function TechData(I_Typ: pAnsiChar; I_CC, I_NET: LongInt;
  Var O_Mult: LongInt;
  Var O_PC, O_SHT, O_SMT, O_SLT: Single):
  LongInt; StdCall; External 'SHK51.DLL';
```

Declaration with Microsoft Visual Basic®:

```
Declare Function TechData Lib "SHK51.DLL" _
  (ByVal I_Typ As String, ByVal I_CC As Long, ByVal I_NET As
  Long, _
  ByRef O_Mult As Long, ByRef O_PC As Single, ByRef O_SHT As
  Single, _
  ByRef O_SMT As Single, ByRef O_SLT As Single) As Long
```

3.6 Allowed values of I_Flags

Value	Constant	Meaning	
1	CalcWithIPUnits	0	SI units
		1	IP units
2	CalcWithCapacity	0	compressor type given
		2	capacity given
4	CalcWithSuperheat	0	input suction gas temperature
		4	input suction superheat
8	CalcWithUsefulSuperheat	0	ignore useful superheat
		8	input useful superheat
16	CalcWithSubcooling	0	input liquid temperature
		16	input liquid subcooling
32	CalcWithSubcooler	0	without subcooler
		32	with subcooler
64	CalcWithSeaWater	0	
		64	reserved
128	CalcWithMiddleTemp	0	based on dew point temperatures
		128	based on mean temperatures

Value	Constant	Meaning
256	CalcWithFan	0 256 reserved
512	CalcWithTandem	0 512 reserved
16384	CalcWithExpansion ¹⁰	0 16384 standard application limits expanded application limits
32768	CalcWithLPDrop	0 32768 reserved
65536	CalcWithHPDrop	0 65536 reserved
131072	CalcWithEcoStar	0 131072 reserved
262144	CalcWithHeatPump	0 262144 reserved

⁸ only interpreted if type given

⁹ with subcooling

¹⁰ expanded application limits: range of allowed condensing temperatures will be expanded for 5K at the top and at the bottom of the application range - calculated data without warranty, use for interim calculations only.

4 Open drive recip ("OHK") → OHK51.DLL

DLL-Version: 6.4.3.0

Attention! For calculation ASEREP32.DLL has to be in the same directory as OHK51.DLL.

Calling convention "stdCall" in Delphi-Pascal corresponds to "__stdcall" in C++

4.1 Function SpeedCheck

Minimum and maximum speed for a given compressor type

Exported function of OHK51.DLL: SpeedCheck

Input parameters		
I_Typ	pChar	compressor type (see chapter 13)
I_CC	LongInt	0 – reserved for future use
Output parameters		
O_RPmin	Single	minimum compressor speed in min ⁻¹
O_RPmax	Single	maximum compressor speed in min ⁻¹
SpeedCheck	LongInt	error message (see chapter 1.3)

Declaration with Borland Delphi® since version 2009:

```
Function SpeedCheck(I_Typ: pAnsiChar; I_CC: LongInt; Var O_RPmin,
    O_RPmax: Single):
    LongInt; StdCall; External 'OHK51.DLL'
```

Declaration with Microsoft Visual Basic®:

```
Declare Function SpeedCheck Lib "OHK51.DLL" _
    (ByVal I_Typ As String, ByVal I_CC As Long, ByRef O_RPmin As
    Single, _
    ByRef O_RPmax As Single) As Long
```

4.2 Function Design

Performance data for a given compressor type respectively

selection of maximum two compressor types with capacity given

Exported function of OHK51.DLL: Design

Input parameters		
I_RPath	pChar	path of refrigerant fluid files *.REF ('ASEREP')
I_Flags	LongInt	preset data (see chapter 4.7)
I_Typ	pChar	compressor type (see chapter 13)
I_CC	LongInt	0 – reserved for future use
I_Ref	pChar	refrigerant (see chapter 13)
I_Q	Double	cooling capacity in kW or kBtu/h
I_TO	Double	evaporation temperature in °C or °F
I_TC	Double	condensing temperature in °C or °F

Input parameters		
I_TS	Double	suction gas temperature in °C / °F or superheat in K / °F dependent on I_Flags
I_TL	Double	liquid temperature in °C / °F or sub-cooling in K / °F dependent on I_Flags
I_TN	Double	useful superheat in K or °F
I_OP	LongInt	operating mode: I_OP = 0: coupling drive, motor speed specified I_OP = 1: belt drive, motor speed and motor pulley diameter specified I_OP = 2: drive not specified, compressor speed specified
I_MP	Single	motor pulley diameter in mm (only for compressor type given and I_OP = 1)
I_MS	Single	motor speed in min ⁻¹ I_OP = 0: 700/750/900 £· I· MS £· 1750 min ⁻¹ I_OP = 1: only 1450 or 1750 min ⁻¹ allowed I_OP = 2: 700/750/900 £· I· MS £· 1750 min ⁻¹
I_CR	Single	100 – reserved for future use (capacity control step in %) Å
Output parameters		
O_T1, O_T2	pChar	two selected compressor types
O_OP1, O_OP2	LongInt	operating mode (see above)
O_Q1, O_Q2	Double	cooling capacity in kW or kBtu/h
O_QU1, O_QU2	Double	evaporator capacity in kW or kBtu/h
O_QN1, O_QN2 ¹¹	Double	cooling capacity at standard operating conditions
O_QC1, O_QC2 ¹²	Double	condenser capacity without heat loss in kW or kBtu/h
O_QH1, O_QH2 ¹²	Double	condenser capacity minus heat loss in kW or kBtu/h
O_P1, O_P2	Double	power consumption in kW
O_E1, O_E2	Double	COP (dimensionless) or EER in Btu/h/W
O_EN1, O_EN2 ¹¹	Double	COP / EER at standard operating conditions
O_VG1, O_VG2	Double	geometric displacement in m ³ /h or ft ³ /h
O_SP1, O_SP2	Single	compressor speed in min ⁻¹
O_MP1, O_MP2	Single	motor pulley diameter in mm (only for I_OP = 1)
O_MT1, O_MT2	Single	necessary driving motor in kW
O_M1, O_M2	Double	mass flow in kg/h or lb/h
O_TH1, O_TH2	Double	hot gas temperature (uncooled) in °C or °F
O_Hint1, O_Hint2	LongInt	hint(s) (see chapter 1.4 and 1.5)
O_Err	pChar	supplement to error message
Design	LongInt	error message (see chapter 1.3)

Declaration with Borland Delphi® since version 2009:

```

Function Design(I_RPath: pAnsiChar; I_Flags: LongInt; I_Typ:
    pAnsiChar;
    I_CC: LongInt; I_Ref: pAnsiChar; I_Q, I_T0, I_TC, I_TS,
    I_TL, I_TN: Double;
    I_OP: LongInt; I_MP, I_MS, I_CR: Single;
    Var O_T1, O_T2: pAnsiChar; O_OP1, O_OP2: LongInt;
    Var O_Q1, O_Q2, O_QU1, O_QU2, O_QN1, O_QN2, O_QC1, O_QC2,
    O_QH1,
    O_QH2, O_P1, O_P2, O_E1, O_E2, O_EN1, O_EN2, O_VG1, O_VG2:
    Double;
    Var O_SP1, O_SP2, O_MP1, O_MP2, O_MT1, O_MT2: Single;
    Var O_M1, O_M2, O_TH1, O_TH2: Double;
    Var O_Hint1, O_Hint2: LongInt; Var O_Err: pAnsiChar):
    LongInt; StdCall; External 'OHK51.DLL';

```

4.3 Function CopyDesign

Performance data for a given compressor type respectively

selection of maximum two compressor types with capacity given

Exported function of OHK51.DLL: CopyDesign

Input parameters		
I_Path	pChar	path of refrigerant fluid files *.REF ('ASEREP')
I_Flags	LongInt	preset data (see chapter 4.7)
I_Typ	pChar	compressor type (see chapter 13)
I_CC	LongInt	0 – reserved for future use
I_Ref	pChar	refrigerant (see chapter 13)
I_Q	Double	cooling capacity in kW or kBtu/h
I_T0	Double	evaporation temperature in °C or °F
I_TC	Double	condensing temperature in °C or °F
I_TS	Double	suction gas temperature in °C / °F or superheat in K / °F dependent on I_Flags
I_TL	Double	liquid temperature in °C / °F or sub-cooling in K / °F dependent on I_Flags
I_TN	Double	useful superheat in K or °F
I_OP	LongInt	operating mode: I_OP = 0: coupling drive, motor speed specified I_OP = 1: belt drive, motor speed and motor pulley diameter specified I_OP = 2: drive not specified, compressor speed specified
I_MP	Single	motor pulley diameter in mm (only for compressor type given and I_OP = 1)
I_MS	Single	motor speed in min ⁻¹ I_OP = 0: 700/750/900 £• I• MS £• 1750 min ⁻¹ I_OP = 1: only 1450 or 1750 min ⁻¹ allowed I_OP = 2: 700/750/900 £• I• MS £• 1750 min ⁻¹
I_CR	Single	100 – reserved for future use (capacity control step in %) Å
Output parameters		
O_T1	pChar	first selected compressor type, filled with spaces on the right
O_SzT1	LongInt	length of O_T1 without spaces
O_T2	pChar	second selected compressor type, filled with spaces on the right
O_SzT2	LongInt	length of O_T2 without spaces
O_OP1, O_OP2	LongInt	operating mode (see above)
O_Q1, O_Q2	Double	cooling capacity in kW or kBtu/h
O_QU1, O_QU2	Double	evaporator capacity in kW or kBtu/h
O_QN1, O_QN2 ¹¹	Double	cooling capacity at standard operating conditions
O_QC1, O_QC2 ¹²	Double	condenser capacity without heat loss in kW or kBtu/h
O_QH1, O_QH2 ¹²	Double	condenser capacity minus heat loss in kW or kBtu/h
O_P1, O_P2	Double	power consumption in kW
O_E1, O_E2	Double	COP (dimensionless) or EER in Btu/h/W
O_EN1, O_EN2 ¹¹	Double	COP / EER at standard operating conditions Å
O_VG1, O_VG2	Double	geometric displacement in m ³ /h or ft ³ /h
O_SP1, O_SP2	Single	compressor speed in min ⁻¹
O_MP1, O_MP2	Single	motor pulley diameter in mm (only for I_OP = 1)
O_MT1, O_MT2	Single	necessary driving motor in kW
O_M1, O_M2	Double	mass flow in kg/h or lb/h
O_TH1, O_TH2	Double	hot gas temperature (uncooled) in °C or °F
O_Hint1, O_Hint2	LongInt	hint(s) (see chapter 1.4 and 1.5)
O_Err	pChar	supplement to error message
O_SzErr	LongInt	length of O_Err without spaces
CopyDesign	LongInt	error message (see chapter 1.3)

Declaration with Borland Delphi® since version 2009:

```
Function CopyDesign(I_Path: pAnsiChar; I_Flags: LongInt; I_Typ:
    pAnsiChar;
    I_CC: LongInt; I_Ref: pAnsiChar; I_Q, I_T0, I_TC, I_TS,
    I_TL, I_TN: Double;
    I_OP: LongInt; I_MP, I_MS, I_CR: Single;
    O_T1: pAnsiChar; Var O_SzT1: LongInt; O_T2: pAnsiChar; Var
    O_SzT2: LongInt;
    Var O_OP1, O_OP2: LongInt;
    Var O_Q1, O_Q2, O_QU1, O_QU2, O_QN1, O_QN2, O_QC1, O_QC2,
    O_QH1,
    O_QH2, O_P1, O_P2, O_E1, O_E2, O_EN1, O_EN2, O_VG1, O_VG2:
    Double;
    Var O_SP1, O_SP2, O_MP1, O_MP2, O_MT1, O_MT2: Single;
    Var O_M1, O_M2, O_TH1, O_TH2: Double;
    Var O_Hint1, O_Hint2: LongInt; O_Err: pAnsiChar; Var
    O_SzErr: LongInt):
    LongInt; StdCall; External 'OHK51.DLL';
```

Buffer variables in calling program:

```
Var
Type1Buf, Type2Buf: AnsiString;
ErrorBuf: AnsiString;
```

Initialization:

```
SetLength(Type1Buf, 30);
SetLength(Type2Buf, 30)
SetLength(ErrorBuf, 20);

O_T1:=@Type1Buf[1]; or: O_T1:=pAnsiChar(Type1Buf);
O_T2:=@Type2Buf[1]; or: O_T2:=pAnsiChar(Type2Buf);
O_Err:=@ErrorBuf[1]; or: O_Err:=pAnsiChar(ErrorBuf);
```

Declaration with Microsoft Visual Basic®:

```
Declare Function CopyDesign Lib "OHK51.DLL" _
    (ByVal I_RPath As String, ByVal I_Flags As Long, ByVal I_Typ
    As String, _
    ByVal I_CC As Long, ByVal I_Ref As String, ByVal I_Q As
    Double, _
    ByVal I_T0 As Double, ByVal I_TC As Double, ByVal I_TS As
    Double, _
    ByVal I_TL As Double, ByVal I_TN As Double, ByVal I_OP As
    Long, _
    ByVal I_MP As Single, ByVal I_MS As Single, ByVal I_CR As
    Single, _
    ByVal O_T1 As String, ByRef O_SzT1 As Long, ByVal O_T2 As
    String, _
    ByRef O_SzT2 As Long, ByRef O_OP1 As Long, ByRef O_OP2 As
```

```

Long, _
ByRef O_Q1 As Double, ByRef O_Q2 As Double, ByRef O_QU1 As
Double, _
ByRef O_QU2 As Double, ByRef O_QN1 As Double, ByRef O_QN2 As
Double, _
ByRef O_QC1 As Double, ByRef O_QC2 As Double, ByRef O_QH1 As
Double, _
ByRef O_QH2 As Double, ByRef O_P1 As Double, ByRef O_P2 As
Double, _
ByRef O_E1 As Double, ByRef O_E2 As Double, ByRef O_EN1 As
Double, _
ByRef O_EN2 As Double, ByRef O_VG1 As Double, ByRef O_VG2 As
Double, _
ByRef O_SP1 As Single, ByRef O_SP2 As Single, ByRef O_MP1 As
Single, _
ByRef O_MP2 As Single, ByRef O_MT1 As Single, ByRef O_MT2 As
Single, _
ByRef O_M1 As Double, ByRef O_M2 As Double, ByRef O_TH1 As
Double, _
ByRef O_TH2 As Double, ByRef O_Hint1 As Long, ByRef O_Hint2
As Long, _
ByVal O_Err As String, ByRef O_SzErr As Long) As Long

```

Buffer variables in calling program:

```

Dim O_T1 As String * 30
Dim O_T2 As String * 30
Dim O_Err As String * 20

```

4.4 Function Thresholds

Minimum and maximum condensing temperature with refrigerant and evaporation temperature given

Exported function of OHK51.DLL: Thresholds

Input parameters		
I_Flags	LongInt	preset data (see chapter 4.7)
I_Ref	pChar	refrigerant (see chapter 13)
I_T0	Double	evaporation temperature in °C or °F
I_CR	Single	100 – reserved for future use (capacity control step in %) Å
I_Range	LongInt	0: application limits of compressor 1: calculation limits without range „data on request“
Output parameters		
O_TCmin	Double	minimum condensing temperature in °C or °F
O_TCmax	Double	maximum condensing temperature in °C or °F
O_Err	pChar	supplement to error message
Thresholds	LongInt	error message (see chapter 1.3)

Declaration with Borland Delphi® since version 2009:

```

Function Thresholds(I_Flags: LongInt; I_Ref: pAnsiChar; I_T0:
Double; I_CR: Single; I_Range: LongInt;
Var O_TCmin, O_TCmax: Double; Var O_Err: pChar):
LongInt; StdCall; External 'OHK51.DLL';

```

4.5 Function CopyThresholds

Minimum and maximum condensing temperature with refrigerant and evaporation temperature given

Exported function of OHK51.DLL: CopyThresholds

Input parameters		
I_Flags	LongInt	preset data (see chapter 4.7)
I_Ref	pChar	refrigerant (see chapter 13)
I_T0	Double	evaporation temperature in °C or °F
I_CR	Single	100 – reserved for future use (capacity control step in %) Å
I_Range	LongInt	0: application limits of compressor 1: calculation limits without range „data on request“
Output parameters		
O_TCmin	Double	minimum condensing temperature in °C or °F
O_TCmax	Double	maximum condensing temperature in °C or °F
O_Err	pChar	supplement to error message, filled with spaces on the right
O_SzErr	LongInt	length of O_Err without spaces
CopyThresholds	LongInt	error message (see chapter 1.3)

Declaration with Borland Delphi® since version 2009:

```
Function CopyThresholds(I_Flags: LongInt; I_Ref: pAnsiChar; I_T0:
    Double; I_CR: Single; I_Range: LongInt;
    Var O_TCmin, O_TCmax: Double; O_Err: pAnsiChar; Var O_SzErr:
    LongInt):
    LongInt; StdCall; External 'OHK51.DLL';
```

Buffer variable in calling program:

```
Var
    ErrorBuf: AnsiString;
```

Initialization:

```
SetLength(ErrorBuf, 20);
O_Err:=@ErrorBuf[1]; or: O_Err:=pAnsiChar(ErrorBuf);
```

Declaration with Microsoft Visual Basic®:

```
Declare Function CopyThresholds Lib "OHK51.DLL" _
    (ByVal I_Flags As Long, ByVal I_Ref As String, ByVal I_T0 As
    Double, _
    ByVal I_CR As Single, ByVal I_Range As Long, _
    ByRef O_TCmin As Double, ByRef O_TCmax As Double, _
    ByVal O_Err As String, ByRef O_SzErr As Long) As Long
```

Buffer variable in calling program:

```
Dim O_Err As String * 20
```

4.6 Driving motor sizes for coupling drive

Compressor types	Motor sizes (coupling housing available)
2T.2(Y), 2N.2(Y) W2TA, W2NA	50 Hz: 3/ 4/ 5.5/ 7.5/ 11 kW 60 Hz: 3.45/ 4.6/ 6.3/ 8.6/ 12.6 kW
4T.2(Y), 4P.2(Y), 4N.2(Y) W4TA, W4PA, W4NA	50 Hz: 5.5/ 7.5/ 11/ 15/ 18.5/ 22/ 30 kW 60 Hz: 6.3/ 8.6/ 12.6/ 17.3/ 21.3/ 24.5/ 33.5 kW
4H.2(Y), 4G.2(Y) W4HA, W4GA 6H.2(Y), 6G.2(Y), 6F.2(Y) W6HA, W6GA, W6FA	50 Hz: 11/ 15/ 18.5/ 22/ 30/ 37/ 45 kW 60 Hz: 12.6/ 17.3/ 21.3/ 24.5/ 33.5/ 41.5/ 51 kW

4.7 Allowed values of I_Flags

Value	Constant	Meaning	
1	CalcWithIPUnits	0 1	SI units IP units
2	CalcWithCapacity	0 2	compressor type given capacity given
4	CalcWithSuperheat	0 4	input suction gas temperature input suction superheat
8	CalcWithUsefulSuperheat	0 8	ignore useful superheat input useful superheat
16	CalcWithSubcooling	0 16	input liquid temperature input liquid subcooling
32	CalcWithSubcooler	0 32	reserved
64	CalcWithSeaWater	0 64	reserved
128	CalcWithMiddleTemp	0 128	based on dew point temperatures based on mean temperatures
256	CalcWithFan	0 256	ignore fan at motor shaft include fan at motor shaft when selecting driving motor
512	CalcWithTandem	0 512	reserved
16384	CalcWithExpansion ¹³	0 16384	standard application limits expanded application limits
32768	CalcWithLPDrop	0 32768	reserved
65536	CalcWithHPDrop	0 65536	reserved
131072	CalcWithEcoStar	0 131072	reserved
262144	CalcWithHeatPump	0 262144	reserved

4.8 Allowed values of I_CR

Compressors	CR capacity control steps (%)
2-cylinder	100
4-cylinder	100, 50
6-cylinder	100, 66, 33

4.9 Maximum power consumption, speed limits

No	Type	Maximum power consumption [kW]	Minimum speed [min ⁻¹]	Maximum speed [min ⁻¹]
1	2T.2(Y) W2TA	6.4	700	1750
2	2N.2(Y) W2NA	8.9	700	1750
3	4T.2(Y) W4TA	12.7	700	1750
4	4P.2(Y) W4PA	14.9	700	1750
5	4N.2(Y) W4NA	17.7	700	1750
6	4H.2(Y) W4HA	22.3	750	1750
7	4G.2(Y) W4GA	25.7	750	1750
8	6H.2(Y) W6HA	33.5	900	1750
9	6G.2(Y) W6GA	38.9	900	1750
10	6F.2(Y) W6FA	43.6	900	1750

Motor power from 30kW (50Hz) resp. 33.5kW (60Hz) requires coupling.

¹¹ according to EN 12900: 20°C suction temperatur. (5K suction superheat with NH3) without liquid subcooling

¹² with liquid subcooling

¹³ expanded application limits: range of allowed condensing temperatures will be expanded for 5K at the top and at the bottom of the application range - calculated data without warranty, use for interim calculations only.

5 Transport compressors ("OHF") → OHF51.DLL

Attention! For calculation ASEREP32.DLL has to be in the same directory as OHF51.DLL.

Calling convention "stdCall" in Delphi-Pascal corresponds to "__stdcall" in C++

5.1 Function SpeedCheck

Minimum and maximum speed for a given compressor type

Exported function of OHF51.DLL: SpeedCheck		
Input parameters		
I_Typ	pChar	compressor type (see chapter 13)
I_CC	LongInt	0 – reserved for future use
Output parameters		
O_RPmin	Single	minimum compressor speed in min ⁻¹
O_RPmax	Single	maximum compressor speed in min ⁻¹
SpeedCheck	LongInt	error message (see chapter 1.3)

Declaration with Borland Delphi® since version 2009:

```
Function SpeedCheck(I_Typ: pAnsiChar; I_CC: LongInt; Var O_RPmin,
    O_RPmax: Single):
    LongInt; StdCall; External 'OHF51.DLL';
```

Declaration with Microsoft Visual Basic®:

```
Declare Function SpeedCheck Lib "OHK51.DLL" _
    (ByVal I_Typ As String, ByVal I_CC As Long, ByRef O_RPmin As _
    Single, _
    ByRef O_RPmax As Single) As Long
```

5.2 Function Design

Performance data for a given compressor type respectively selection of maximum two compressor types with capacity given

Exported function of OHF51.DLL: Design		
Input parameters		
I_RPath	pChar	path of refrigerant fluid files *.REF ('ASEREP')
I_Flags	LongInt	preset data (see chapter 5.6)
I_Typ	pChar	compressor type (see chapter 13)
I_CC	LongInt	0 – reserved for future use
I_Ref	pChar	refrigerant (see chapter 13)
I_Q	Double	cooling capacity in kW or kBtu/h
I_T0	Double	evaporation temperature in °C or °F
I_TC	Double	condensing temperature in °C or °F
I_TS	Double	suction gas temperature in °C / °F or superheat in K / °F dependent on I_Flags

Exported function of OHF51.DLL: Design		
I_TL	Double	liquid temperature in °C / ° F or sub-cooling in K / °F dependent on I_Flags
I_TN	Double	useful superheat in K or °F
I_SP	Single	compressor speed in min ⁻¹
I_CR	Single	100 – reserved for future use (capacity control step in %)
Output parameters		
O_T1, O_T2	pChar	two selected compressor types
O_Q1, O_Q2	Double	cooling capacity in kW or kBtu/h
O_QU1, O_QU2	Double	evaporator capacity in kW or kBtu/h
O_QN1, O_QN2 ¹⁴	Double	cooling capacity at standard operating conditions
O_QC1, O_QC2 ¹⁵	Double	condenser capacity without heat loss in kW or kBtu/h
O_QH1, O_QH2 ¹⁵	Double	condenser capacity minus heat loss in kW or kBtu/h
O_P1, O_P2	Double	power consumption in kW
O_E1, O_E2	Double	COP (dimensionless) or EER in Btu/h/W
O_EN1, O_EN2 ¹⁴	Double	COP / EER at standard operating conditions
O_VG1, O_VG2	Double	geometric displacement in m ³ /h or ft ³ /h
O_CV1, O_CV2	Single	cylinder volume in cm ³ or cu in per revolution
O_M1, O_M2	Double	mass flow in kg/h or lb/h
O_TH1, O_TH2	Double	hot gas temperature (uncooled) in °C or °F
O_Hint1, O_Hint2	LongInt	hint(s) (see chapter 1.4 and 1.5)
O_Err	pChar	supplement to error message
Design	LongInt	error message (see chapter 1.3)

Declaration with Borland Delphi® since version 2009:

```
Function Design(I_RPath: pAnsiChar; I_Flags: LongInt; I_Typ:
    pAnsiChar;
    I_CC: LongInt; I_Ref: pAnsiChar; I_Q, I_T0, I_TC, I_TS,
    I_TL, I_TN: Double;
    I_SP, I_CR: Single;
    Var O_T1, O_T2: pAnsiChar;
    Var O_Q1, O_Q2, O_QU1, O_QU2, O_QN1, O_QN2, O_QC1, O_QC2,
    O_QH1,
    O_QH2, O_P1, O_P2, O_E1, O_E2, O_EN1, O_EN2, O_VG1, O_VG2:
    Double;
    Var O_CV1, O_CV2: Single;
    Var O_M1, O_M2, O_TH1, O_TH2: Double; Var O_Hint1, O_Hint2:
    LongInt;
    Var O_Err: pAnsiChar): LongInt; StdCall; External 'OHF51.DLL'
```

5.3 Function CopyDesign

Performance data for a given compressor type respectively
selection of maximum two compressor types with capacity given

Exported function of OHF51.DLL: CopyDesign		
Input parameters		
I_Path	pChar	path of refrigerant fluid files *.REF ('ASEREP')
I_Flags	LongInt	preset data (see chapter 5.6)
I_Typ	pChar	compressor type (see chapter 13)
I_CC	LongInt	0 – reserved for future use
I_Ref	pChar	refrigerant (see chapter 13)
I_Q	Double	cooling capacity in kW or kBtu/h
I_T0	Double	evaporation temperature in °C or °F
I_TC	Double	condensing temperature in °C or °F

Exported function of OHF51.DLL: CopyDesign		
I_TS	Double	suction gas temperature in °C / °F or superheat in K / °F dependent on I_Flags
I_TL	Double	liquid temperature in °C / °F or sub-cooling in K / °F dependent on I_Flags
I_TN	Double	useful superheat in K or °F
I_SP	Single	compressor speed in min ⁻¹
I_CR	Single	100 – reserved for future use (capacity control step in %)
Output parameters		
O_T1	pChar	first selected compressor type, filled with spaces on the right
O_SzT1	LongInt	length of O_T1 without spaces
O_T2	pChar	second selected compressor type, filled with spaces on the right
O_SzT2	LongInt	length of O_T2 without spaces
O_Q1, O_Q2	Double	cooling capacity in kW or kBtu/h
O_QU1, O_QU2	Double	evaporator capacity in kW or kBtu/h
O_QN1, O_QN2 ¹⁴	Double	cooling capacity at standard operating conditions
O_QC1, O_QC2 ¹⁵	Double	condenser capacity without heat loss in kW or kBtu/h
O_QH1, O_QH2 ¹⁵	Double	condenser capacity minus heat loss in kW or kBtu/h
O_P1, O_P2	Double	power consumption in kW
O_E1, O_E2	Double	COP (dimensionless) or EER in Btu/h/W
O_EN1, O_EN2 ¹⁴	Double	COP / EER at standard operating conditions
O_VG1, O_VG2	Double	geometric displacement in m ³ /h or ft ³ /h
O_CV1, O_CV2	Single	cylinder volume in cm ³ or cu in per revolution
O_M1, O_M2	Double	mass flow in kg/h or lb/h
O_TH1, O_TH2	Double	hot gas temperature (uncooled) in °C or °F
O_Hint1, O_Hint2	LongInt	hint(s) (see chapter 1.4 and 1.5)
O_Err	pChar	supplement to error message
O_SzErr	LongInt	length of O_Err without spaces
CopyDesign	LongInt	error message (see chapter 1.3)

Declaration with Borland Delphi® since version 2009:

```
Function CopyDesign(I_Path: pAnsiChar; I_Flags: LongInt; I_Typ:
    pAnsiChar;
    I_CC: LongInt; I_Ref: pAnsiChar; I_Q, I_T0, I_TC, I_TS,
    I_TL, I_TN: Double;
    I_SP, I_CR: Single;
    O_T1: pAnsiChar; Var O_SzT1: LongInt; O_T2: pAnsiChar; Var
    O_SzT2: LongInt;
    Var O_Q1, O_Q2, O_QU1, O_QU2, O_QN1, O_QN2, O_QC1, O_QC2,
    O_QH1,
    O_QH2, O_P1, O_P2, O_E1, O_E2, O_EN1, O_EN2, O_VG1, O_VG2:
    Double;
    Var O_CV1, O_CV2: Single;
    Var O_M1, O_M2, O_TH1, O_TH2: Double;
    Var O_Hint1, O_Hint2: LongInt; O_Err: pAnsiChar; Var
    O_SzErr: LongInt):
    LongInt; StdCall; External 'OHF51.DLL'
```

Buffer variables in calling program:

```
Var
    Type1Buf, Type2Buf: AnsiString;
    ErrorBuf: AnsiString;
```

Initialization:

```
SetLength(Type1Buf, 30);
SetLength(Type2Buf, 30)
SetLength(ErrorBuf, 20);

O_T1:=@Type1Buf[1]; or: O_T1:=pAnsiChar(Type1Buf);
O_T2:=@Type2Buf[1]; or: O_T2:=pAnsiChar(Type2Buf);
O_Err:=@ErrorBuf[1]; or: O_Err:=pAnsiChar(ErrorBuf);
```

Declaration with Microsoft Visual Basic®:

```
Declare Function CopyDesign Lib "OHK51.DLL" _
    (ByVal I_RPath As String, ByVal I_Flags As Long, ByVal I_Type
    As String, _
    ByVal I_CC As Long, ByVal I_Ref As String, ByVal I_Q As
    Double, _
    ByVal I_T0 As Double, ByVal I_TC As Double, ByVal I_TS As
    Double, _
    ByVal I_TL As Double, ByVal I_TN As Double, ByVal I_OP As
    Long, _
    ByVal I_MP As Single, ByVal I_MS As Single, ByVal I_CR As
    Single, _
    ByVal O_T1 As String, ByRef O_SzT1 As Long, ByVal O_T2 As
    String, _
    ByRef O_SzT2 As Long, ByRef O_OP1 As Long, ByRef O_OP2 As
    Long, _
    ByRef O_Q1 As Double, ByRef O_Q2 As Double, ByRef O_QU1 As
    Double, _
    ByRef O_QU2 As Double, ByRef O_QN1 As Double, ByRef O_QN2 As
    Double, _
    ByRef O_QC1 As Double, ByRef O_QC2 As Double, ByRef O_QH1 As
    Double, _
    ByRef O_QH2 As Double, ByRef O_P1 As Double, ByRef O_P2 As
    Double, _
    ByRef O_E1 As Double, ByRef O_E2 As Double, ByRef O_EN1 As
    Double, _
    ByRef O_EN2 As Double, ByRef O_VG1 As Double, ByRef O_VG2 As
    Double, _
    ByRef O_SP1 As Single, ByRef O_SP2 As Single, ByRef O_MP1 As
    Single, _
    ByRef O_MP2 As Single, ByRef O_MT1 As Single, ByRef O_MT2 As
    Single, _
    ByRef O_M1 As Double, ByRef O_M2 As Double, ByRef O_TH1 As
    Double, _
    ByRef O_TH2 As Double, ByRef O_Hint1 As Long, ByRef O_Hint2
    As Long, _
    ByVal O_Err As String, ByRef O_SzErr As Long) As Long
```

Buffer variables in calling program:

```
Dim O_T1 As String * 30
Dim O_T2 As String * 30
Dim O_Err As String * 20
```

5.4 Function Thresholds

Minimum and maximum condensing temperature with refrigerant and evaporation temperature given

Exported function of OHF51.DLL: Thresholds		
Input parameters		
I_Flags	LongInt	preset data (see chapter 5.6)
I_Ref	pChar	refrigerant (see chapter 13)
I_T0	Double	evaporation temperature in °C or °F
I_CR	Single	<i>100 – reserved for future use (capacity control step in %)</i> Å
I_Range	LongInt	0: application limits of compressor 1: calculation limits without range „data on request“
Output parameters		
O_TCmin	Double	minimum condensing temperature in °C or °F
O_TCmax	Double	maximum condensing temperature in °C or °F
O_Err	pChar	supplement to error message
Thresholds	LongInt	error message (see chapter 1.3)

Declaration with Borland Delphi® since version 2009:

```
Function Thresholds(I_Flags: LongInt; I_Ref: pAnsiChar; I_T0:
    Double; I_CR: Single; I_Range: LongInt;
    Var O_TCmin, O_TCmax: Double; Var O_Err: pAnsiChar):
    LongInt; StdCall; External 'OHF51.DLL';
```

5.5 Function CopyThresholds

Minimum and maximum condensing temperature with refrigerant and evaporation temperature given

Exported function of OHF51.DLL: CopyThresholds		
Input parameters		
I_Flags	LongInt	preset data (see chapter 5.6)
I_Ref	pChar	refrigerant (see chapter 13)
I_T0	Double	evaporation temperature in °C or °F
I_CR	Single	<i>100 – reserved for future use (capacity control step in %)</i> Å
I_Range	LongInt	0: application limits of compressor 1: calculation limits without range „data on request“
Output parameters		
O_TCmin	Double	minimum condensing temperature in °C or °F
O_TCmax	Double	maximum condensing temperature in °C or °F
O_Err	pChar	supplement to error message, filled with spaces on the right
O_SzErr	LongInt	length of O_Err without spaces
CopyThresholds	LongInt	error message (see chapter 1.3)

Declaration with Borland Delphi® since version 2009:

```
Function CopyThresholds(I_Flags: LongInt; I_Ref: pAnsiChar; I_T0:
    Double; I_CR: Single; I_Range: LongInt;
    Var O_TCmin, O_TCmax: Double; O_Err: pAnsiChar; Var O_SzErr:
    LongInt):
    LongInt; StdCall; External 'OHF51.DLL'
```

Buffer variable in calling program:

```
Var
  ErrorBuf: String;
```

Initialization:

```
SetLength(ErrorBuf, 20);
O_Err:=@ErrorBuf[1]; or: O_Err:=pAnsiChar(ErrorBuf);
```

Declaration with Microsoft Visual Basic®:

```
Declare Function CopyThresholds Lib "OHF51.DLL" _
  (ByVal I_Flags As Long, ByVal I_Ref As String, ByVal I_T0 As
  Double, _
  ByVal I_CR As Single, ByVal I_Range As Long _
  ByRef O_TCmin As Double, ByRef O_TCmax As Double, _
  ByVal O_Err As String, ByRef O_SzErr As Long) As Long
```

Buffer variable in calling program:

```
Dim O_Err As String * 20
```

5.6 Allowed values of I_Flags

Value	Constant	Meaning	
1	CalcWithIPUnits	0	SI units
		1	IP units
2	CalcWithCapacity	0	compressor type given
		2	capacity given
4	CalcWithSuperheat	0	input suction gas temperature
		4	input suction superheat
8	CalcWithUsefulSuperheat	0	ignore useful superheat
		8	input useful superheat
16	CalcWithSubcooling	0	input liquid temperature
		16	input liquid subcooling
32	CalcWithSubcooler	0	
		32	reserved
64	CalcWithSeaWater	0	
		64	reserved
128	CalcWithMiddleTemp	0	based on dew point temperatures
		128	based on mean temperatures
256	CalcWithFan	0	
		256	reserved
512	CalcWithTandem	0	
		512	reserved
16384	CalcWithExpansion ¹⁶	0	standard application limits
		16384	expanded application limits
32768	CalcWithLPDrop	0	
		32768	reserved

Value	Constant	Meaning
65536	CalcWithHPDrop	0 65536 reserved
131072	CalcWithEcoStar	0 131072 reserved
262144	CalcWithHeatPump	0 262144 reserved

5.7 Allowed values of I_CR

Compressors	CR capacity control steps (%)
4-cylinder	100, 50
6-cylinder	100, 66, 33

5.8 Maximum torque, speed limits

No	Type	Maximum torque [Nm]	Minimum speed [min ⁻¹]	Maximum speed [min ⁻¹]
1	F400(Y)	120	500	4500
2	F600(Y)	120	500	4000
3	4UFC(Y)	120	500 ¹⁷	3500
4	4TFC(Y)	120	500 ¹⁷	3500
5	4PFC(Y)	120	500 ¹⁷	3500
6	4NFC(Y)	120	500 ¹⁷	3500
7	6UFC(Y)	130	500 ¹⁷	3500
8	6TFC(Y)	130	500 ¹⁷	3500
9	6PFC(Y)	130	500 ¹⁷	3500
10	6NFC(Y)	130	500 ¹⁷	3500

¹⁴ according to EN 12900: 20°C suction temperature without liquid subcooling

¹⁵ with liquid subcooling

¹⁶ expanded application limits: range of allowed condensing temperatures will be expanded for 5K at the top and at the bottom of the application range - calculated data without warranty, use for interim calculations only.

¹⁷ speed below 950min-1only on request

6 Semi-hermetic screws ("HS") → HS51.DLL

Attention! For calculation ASEREP32.DLL and BNP50.DLL have to be in the same directory as HS51.DLL.

Calling convention "register" in Delphi-Pascal corresponds to "__fastcall" in C++

6.1 Function Design

Performance data for a given compressor type respectively

selection of maximum two compressor types with capacity given

Exported function of HS51.DLL: Design		
Input parameters		
I_RPath	pChar	path of refrigerant fluid files *.REF ('ASEREP')
I_NPath	pChar	path of name plate data files BNPB*.DAT
I_Flags	LongInt	preset data (see chapter 6.7)
I_Typ	pChar	compressor type (see chapter 13)
I_CC	LongInt	0 - reserved for future use
I_Ref	pChar	refrigerant (see chapter 13)
I_Q	Double	cooling capacity in kW or kBtu/h
I_T0	Double	evaporation temperature in °C or °F
I_TC	Double	condensing temperature in °C or °F
I_TS	Double	suction gas temperature in °C / °F or superheat in K / °F dependent on I_Flags
I_TL	Double	operating mode 1 (standard): liquid temperature in °C / °F or sub-cooling in K / °F dependent on I_Flags operating mode 2 or 3 (ECO): I_TL is ignored, calculation without liquid subcooling
I_TM	LongInt	only operating mode 2 (ECO): kind of I_TLC (subcooler temperature)
I_TLC	Double	only operating mode 2 (ECO): I_TM = 0: liquid temperature in °C or °F I_TM = 1: liquid subcooling in K or °F I_TM = 2: temp. diff. between subcooler and ECO temperature in K or °F
I_TOC	LongInt	oil cooling I_TOC = 1 : liquid injection LI (only HSK series) else: external oil cooling
I_TOL	Double	oil temperature in °C or °F FI operation: max. 110 °C (230 °F) else max. 100 °C (212 °F), recommended 80 °C (176 °F)
I_TN	Double	useful superheat in K or °F
I_NET	LongInt	three-digit motor index (see chapter 13)
I_DS ¹⁸	LongInt	motor winding type: 1 = delta, 2 = star, 3 = part winding (see chapter 13)
I_OV ¹⁸	LongInt	operating voltage (see chapter 13)
I_FI	LongInt	frequency inverter: 0=without, 1=integrated, 2=external
I_FCF ¹⁹	Double	selected FI frequency in Hz
I_FCV ¹⁹	LongInt	supply voltage in V
I_FCOF ¹⁹	LongInt	supply frequency in Hz
I_FCMV ¹⁹	LongInt	0 – reserved for future use(max. output voltage in V)
I_OP	LongInt	operating mode (see chapter 6.8)
I_CR ¹⁸	Single	100 – reserved for future use (capacity control step in %)
Output parameters		

Exported function of HS51.DLL: Design		
<u>O_T1</u> , <u>O_T2</u>	pChar	two selected compressor types
<u>O_OP1</u> , <u>O_OP2</u>	LongInt	operating mode (see chapter 6.8)
<u>O_FCF1</u> , <u>O_FCF2</u> ³	LongInt	inverter frequency in Hz
<u>O_FCFmin1</u> , <u>O_FCFmin2</u> ²	LongInt	inverter frequency of minimum capacity in Hz
<u>O_FCFmax1</u> , <u>O_FCFmax2</u> ²	LongInt	inverter frequency of maximum capacity in Hz
<u>O_Q1</u> , <u>O_Q2</u>	Double	cooling capacity in kW or kBtu/h
<u>O_Qmin1</u> , <u>O_Qmin2</u> ³	Double	minimum cooling capacity / heating capacity in kW or kBtu/h
<u>O_Qmax1</u> , <u>O_Qmax2</u> ³	Double	maximum cooling capacity / heating capacity in kW or kBtu/h
<u>O_QU1</u> , <u>O_QU2</u>	Double	evaporator capacity in kW or kBtu/h
<u>O_QN1</u> , <u>O_QN2</u> ²⁰	Double	cooling capacity at standard operating conditions
<u>O_QC1</u> , <u>O_QC2</u> ²¹	Double	condenser capacity without heat rejection in kW or kBtu/h
<u>O_QH1</u> , <u>O_QH2</u> ²¹	Double	condenser capacity minus heat rejection in kW or kBtu/h
<u>O_P1</u> , <u>O_P2</u>	Double	power consumption in kW
<u>O_I1</u> , <u>O_I2</u>	Double	current in A
<u>O_COS1</u> , <u>O_COS2</u>	Double	power factor cos PHI
<u>O_E1</u> , <u>O_E2</u>	Double	COP (dimensionless) or EER in Btu/h/W
<u>O_EN1</u> , <u>O_EN2</u> ²⁰	Double	COP / EER at standard operating conditions
<u>O_VG1</u> , <u>O_VG2</u>	Double	geometric displacement in m ³ /h or ft ³ /h
<u>O_M1</u> , <u>O_M2</u>	Double	HP mass flow in kg/h or lb/h
<u>O_ME1</u> , <u>O_ME2</u>	Double	ECO resp. LI mass flow in kg/h or lb/h
<u>O_QS1</u> , <u>O_QS2</u>	Double	subcooler capacity in kW or kBtu/h
<u>O_TE1</u> , <u>O_TE2</u>	Double	saturated ECONOMISER temperature in °C or °F
<u>O_PE1</u> , <u>O_PE2</u>	Double	ECONOMISER pressure in bara or psia
<u>O_TL1</u> , <u>O_TL2</u>	Double	liquid temperature in °C or °F operating mode 1: behind condenser operating mode 2 or 3 (ECO): behind subcooler
<u>O_TH1</u> , <u>O_TH2</u>	Double	hot gas temperature (uncooled) in °C or °F
<u>O_QA1</u> , <u>O_QA2</u>	Double	additional cooling in kW or kBtu/h
<u>O_VOL1</u> , <u>O_VOL2</u>	Double	oil volume flow in m ³ /h or US gpm
<u>O_TOL1</u> , <u>O_TOL2</u> ²²	Double	oil cooler outlet temperature in °C or °F
<u>O_TJ1</u> , <u>O_TJ2</u> ²³	Double	liquid injection temperature in °C or °F
<u>O_PJ1</u> , <u>O_PJ2</u> ²³	Double	liquid injection pressure in bara or psia
<u>O_Hint1</u> , <u>O_Hint2</u>	LongInt	hint(s) (see chapter 1.4 and 1.5)
<u>O_Err</u>	pChar	supplement to error message
Design	LongInt	error message (see chapter 1.3)

Declaration with Borland Delphi® since version 2009:

```

Function Design(I_RPath, I_NPath: pAnsiChar; I_Flags: LongInt;
  I_Typ: pAnsiChar;
  I_CC: LongInt; I_Ref: pAnsiChar; I_Q, I_T0, I_TC, I_TS,
  I_TL: Double; I_TM: LongInt;
  I_TLC: Double; I_TOC: LongInt; I_TOL, I_TN: Double;
  I_NET, I_DS, I_OV, I_FI: LongInt; I_FCF: Double; I_FCV,
  I_FCOF, I_FCMV, I_OP: LongInt; I_CR: Single;
  Var O_T1, O_T2: pAnsiChar; Var O_OP1, O_OP2, O_FCF1, O_FCF2,
  O_FCFmin1, O_FCFmin2, O_FCFmax1, O_FCFmax2: LongInt;
  Var O_Q1, O_Q2, O_Qmin1, O_Qmin2, O_Qmax1, O_Qmax2, O_QU1,
  O_QU2, O_QN1, O_QN2, O_QC1, O_QC2,
  O_QH1, O_QH2, O_P1, O_P2, O_I1, O_I2, O_COS1, O_COS2, O_E1,
  O_E2,
  O_EN1, O_EN2, O_VG1, O_VG2, O_M1, O_M2, O_ME1, O_ME2, O_QS1,
  O_QS2,
  O_TE1, O_TE2, O_PE1, O_PE2, O_TL1, O_TL2, O_TH1, O_TH2,
  O_QA1, O_QA2,
  O_VOL1, O_VOL2, O_TOL1, O_TOL2, O_TJ1, O_TJ2, O_PJ1, O_PJ2:
  Double;

```

```
Var O_Hint1, O_Hint2: LongInt; Var O_Err: pAnsiChar);
LongInt; StdCall; External 'HS51.DLL';
```

6.2 Function CopyDesign

Performance data for a given compressor type respectively

selection of maximum two compressor types with capacity given

Exported function of HS51.DLL: CopyDesign		
Input parameters		
I_RPath	pChar	path of refrigerant fluid files *.REF ('ASEREP')
I_NPath	pChar	path of name plate data files BNPB*.DAT
I_Flags	LongInt	preset data (see chapter 6.7)
I_Typ	pChar	compressor type (see chapter 13)
I_CC	LongInt	0 - reserved for future use
I_Ref	pChar	refrigerant (see chapter 13)
I_Q	Double	cooling capacity in kW or kBtu/h
I_TO	Double	evaporation temperature in °C or °F
I_TC	Double	condensing temperature in °C or °F
I_TS	Double	suction gas temperature in °C / °F or superheat in K / °F dependent on I_Flags
I_TL	Double	operating mode 1 (standard): liquid temperature in °C / °F or sub-cooling in K / °F dependent on I_Flags operating mode 2 or 3 (ECO): I_TL is ignored, calculation without liquid subcooling
I_TM	LongInt	only operating mode 2 (ECO): kind of I_TLC (subcooler temperature)
I_TLC	Double	only operating mode 2 (ECO): I_TM = 0: liquid temperature in °C or °F I_TM = 1: liquid subcooling in K or °F I_TM = 2: temp. diff. between subcooler and ECO temperature in K or °F
I_TOC	LongInt	oil cooling I_TOC = 1 : liquid injection LI (only HSK series) else: external oil cooling
I_TOL	Double	oil temperature in °C or °F FI operation: max. 110 °C (230 °F) else max. 100 °C (212 °F), recommended 80 °C (176 °F)
I_TN	Double	useful superheat in K or °F
I_NET	LongInt	three-digit motor index (see chapter 13)
I_DS ¹⁸	LongInt	motor winding type: 1 = delta, 2 = star, 3 = part winding (see chapter 13)
I_OV ¹⁸	LongInt	operating voltage (see chapter 13)
I_FI	LongInt	frequency inverter: 0=without, 1=integrated, 2=external
I_FCF ¹⁹	Double	selected FI frequency in Hz
I_FCV ¹⁹	LongInt	supply voltage in V
I_FCOF ¹⁹	LongInt	supply frequency in Hz
I_FCMV	LongInt	0 – reserved for future use (max. output voltage in V)
I_OP	LongInt	operating mode (see chapter 6.8)
I_CR ¹⁸	Single	100 – reserved for future use (capacity control step in %)
Output parameters		
O_T1	pChar	first selected compressor type, filled with spaces on the right
O_SzT1	LongInt	length of O_T1 without spaces
O_T2	pChar	second selected compressor type, filled with spaces on the right
O_SzT2	LongInt	length of O_T2 without spaces
DesignData	TDesignData	see below
O_Hint1, O_Hint2	LongInt	hint(s) (see chapter 1.4 and 1.5)
O_Err	pChar	supplement to error message

Exported function of HS51.DLL: CopyDesign		
O_SzErr	LongInt	length of O_Err without spaces
CopyDesign	LongInt	error message (see chapter 1.3)
Data fields of array DesignData		
O_OP1, O_OP2	LongInt	operating mode (see chapter 6.8)
O_FCF1, O_FCF2 ³	LongInt	inverter frequency in Hz
O_FCFmin1, O_FCFmin2 ²	LongInt	inverter frequency of minimum capacity in Hz
O_FCFmax1, O_FCFmax2 ²	LongInt	inverter frequency of maximum capacity in Hz
O_Q1, O_Q2	Double	cooling capacity in kW or kBtu/h
O_Qmin1, O_Qmin2 ³	Double	minimum cooling capacity / heating capacity in kW or kBtu/h
O_Qmax1, O_Qmax2 ³	Double	maximum cooling capacity / heating capacity in kW or kBtu/h
O_QU1, O_QU2	Double	evaporator capacity in kW or kBtu/h
O_QN1, O_QN2 ²⁰	Double	cooling capacity at standard operating conditions
O_QC1, O_QC2 ²¹	Double	condenser capacity without heat rejection in kW or kBtu/h
O_QH1, O_QH2 ²¹	Double	condenser capacity minus heat rejection in kW or kBtu/h
O_P1, O_P2	Double	power consumption in kW
O_I1, O_I2	Double	current in A
O_COS1, O_COS2	Double	power factor cos PHI
O_E1, O_E2	Double	COP (dimensionless) or EER in Btu/h/W
O_EN1, O_EN2 ²⁰	Double	COP / EER at standard operating conditions
O_VG1, O_VG2	Double	geometric displacement in m ³ /h or ft ³ /h
O_M1, O_M2	Double	HP mass flow in kg/h or lb/h
O_ME1, O_ME2	Double	ECO resp. LI mass flow in kg/h or lb/h
O_QS1, O_QS2	Double	subcooler capacity in kW or kBtu/h
O_TE1, O_TE2	Double	saturated ECONOMISER temperature in °C or °F
O_PE1, O_PE2	Double	ECONOMISER pressure in bara or psia
O_TL1, O_TL2	Double	liquid temperature in °C or °F operating mode 1: behind condenser operating mode 2 or 3 (ECO): behind subcooler
O_TH1, O_TH2	Double	hot gas temperature (uncooled) in °C or °F
O_QA1, O_QA2	Double	additional cooling in kW or kBtu/h
O_VOL1, O_VOL2	Double	oil volume flow in m ³ /h or US gpm
O_TOL1, O_TOL2 ²²	Double	oil cooler outlet temperature in °C or °F
O_TJ1, O_TJ2 ²³	Double	liquid injection temperature in °C or °F
O_PJ1, O_PJ2 ²³	Double	liquid injection pressure in bara or psia

Declaration with Borland Delphi® since version 2009:

```

Type TDesignData = Record
    O_OP1, O_OP2 : LongInt;
    O_FCF1, O_FCF2 : LongInt;
    O_FCFmin1, O_FCFmin2 : LongInt;
    O_FCFmax1, O_FCFmax2 : LongInt;
    O_Q1, O_Q2 : Double;
    O_Qmin1, O_Qmin2 : Double;
    O_Qmax1, O_Qmax2 : Double;
    O_QU1, O_QU2 : Double;
    O_QN1, O_QN2 : Double;
    O_QC1, O_QC2 : Double;
    O_QH1, O_QH2 : Double;
    O_P1, O_P2 : Double;
    O_I1, O_I2 : Double;
    O_COS1, O_COS2 : Double;
    O_E1, O_E2 : Double;
    O_EN1, O_EN2 : Double;
    O_VG1, O_VG2 : Double;
    O_M1, O_M2 : Double;
    O_ME1, O_ME2 : Double;
    O_QS1, O_QS2 : Double;

```

```

O_TE1, O_TE2 : Double;
O_PE1, O_PE2 : Double;
O_TL1, O_TL2 : Double;
O_TH1, O_TH2 : Double;
O_QA1, O_QA2 : Double;
O_VOL1, O_VOL2 : Double;
O_TOL1, O_TOL2 : Double;
O_TJ1, O_TJ2 : Double;
O_PJ1, O_PJ2 : Double;
End; Function CopyDesign(I_RPath, I_NPath: pAnsiChar;
I_Flags: LongInt; I_Typ: pAnsiChar;
I_CC: LongInt; I_Ref: pAnsiChar; I_Q, I_T0, I_TC, I_TS,
I_TL: Double; I_TM: LongInt;
I_TLC: Double; I_TOC: LongInt; I_TOL, I_TN: Double;
I_NET, I_DS, I_OV, I_FI: LongInt; I_FCF: Double; I_FCV,
I_FCOF, I_FCMV, I_OP: LongInt; I_CR: Single;
O_T1: pAnsiChar; Var O_SzT1: LongInt; O_T2: pAnsiChar; Var
O_SzT2: LongInt;
Var DesignData: TDesignData; Var O_Hint1, O_Hint2: LongInt;
O_Err: PAnsiChar; Var O_SzErr: LongInt): LongInt; StdCall;
External 'HS51.DLL'; Buffer variables in calling program:

```

```

Var
Type1Buf, Type2Buf: AnsiString;
ErrorBuf: AnsiString;

```

Initialization:

```

SetLength(Type1Buf, 30);
SetLength(Type2Buf, 30);
SetLength(ErrorBuf, 20);
O_T1:=@Type1Buf[1]; or: O_T1:=PAnsiChar(Type1Buf);
O_T2:=@Type2Buf[1]; or: O_T2:=PAnsiChar(Type2Buf);
O_Err:=@ErrorBuf[1]; or: O_Err:=PAnsiChar(ErrorBuf);

```

Declaration with Microsoft Visual Basic®:

```

Type TDesignData
    O_OP1 As Long
    O_OP2 As Long
    O_FCF1 As Long
    O_FCF2 As Long
    O_FCFmin1 As Long
    O_FCFmin2 As Long
    O_FCFmax1 As Long
    O_FCFmax2 As Long
    O_Q1 As Double
    O_Q2 As Double

    O_Qmin1 As Double
    O_Qmin2 As Double

```

```

O_Qmax1 As Double
O_Qmax2 As Double
O_QU1 As Double
O_QU2 As Double
O_QN1 As Double
O_QN2 As Double
O_QC1 As Double
O_QC2 As Double
O_QH1 As Double
O_QH2 As Double
O_P1 As Double
O_P2 As Double
O_I1 As Double
O_I2 As Double
O_COS1 As Double
O_COS2 As Double
O_E1 As Double
O_E2 As Double
O_EN1 As Double
O_EN2 As Double
O_VG1 As Double
O_VG2 As Double
O_M1 As Double
O_M2 As Double
O_ME1 As Double
O_ME2 As Double
O_QS1 As Double
O_QS2 As Double
O_TE1 As Double
O_TE2 As Double
O_PE1 As Double
O_PE2 As Double
O_TL1 As Double
O_TL2 As Double
O_TH1 As Double
O_TH2 As Double
O_QA1 As Double
O_QA2 As Double
O_VOL1 As Double
O_VOL2 As Double
O_TOL1 As Double
O_TOL2 As Double
O_TJ1 As Double
O_TJ2 As Double
O_PJ1 As Double
O_PJ2 As Double
End Type

```

```

Declare Function CopyDesign Lib "HS51.DLL" _
    (ByVal I_RPath As String, ByVal I_NPath As String, ByVal
    I_Flags As Long, _
    ByVal I_Typ As String, ByVal I_CC As Long, ByVal I_Ref As
    String, _
    ByVal I_Q As Double, ByVal I_T0 As Double, ByVal I_TC As
    Double, _
    ByVal I_TS As Double, ByVal I_TL As Double, ByVal I_TM As

```

```

Long, _
ByVal I_TLC As Double, ByVal I_TOC As Long, ByVal I_TOL As
Double, _
ByVal I_TN As Double, _
ByVal I_Net As Long, ByVal I_DS As Long, ByVal I_OV As Long,
ByVal I_FI As Long, _
ByVal I_FCF As Double, ByVal I_FCV As Long, ByVal I_FCOF As
Long, _
ByVal I_FCMV As Long, ByVal I_OP As Long, ByVal I_CR As
Single, _
ByVal O_T1 As String, ByRef O_SzT1 As Long, _
ByVal O_T2 As String, ByRef O_SzT2 As Long, _
ByRef DesignData As TDesignData, _
ByRef O_Hint1 As Long, ByRef O_Hint2 As Long, ByVal O_Err As
String, _
ByRef O_SzErr As Long) As Long

```

Buffer variables in calling program:

```

Dim O_T1 As String * 30
Dim O_T2 As String * 30
Dim O_Err As String * 20

```

6.3 Function Thresholds

Minimum and maximum condensing temperature with refrigerant and evaporation temperature given

Exported function of HS51.DLL: Thresholds		
Input parameters		
I_Flags	LongInt	preset data (see chapter 6.7)
I_Typ	pChar	compressor type (see chapter 13)
I_CC	LongInt	0 - <i>reserved for future use</i>
I_Ref	pChar	refrigerant (see chapter 13)
I_T0	Double	evaporation temperature in °C or °F
I_FI	LongInt	frequency inverter: 0=without, 1=integrated, 2=external
I_OP	LongInt	operating mode (see chapter 6.8)
I_CR ¹⁸	Single	100 – <i>reserved for future use (capacity control step in %)</i>
I_Range	LongInt	0: application limits of compressor 1: calculation limits without range „data on request“
Output parameters		
O_OP	LongInt	operating mode (see chapter 6.8)
O_TCmin	Double	minimum condensing temperature in °C or °F
O_TCmax	Double	maximum condensing temperature in °C or °F
O_Err	pChar	supplement to error message
Thresholds	LongInt	error message (see chapter 1.3)

Temperatures O_TCmin and O_TCmax are dew point temperatures.

Declaration with Borland Delphi® since version 2009:

```

Function Thresholds(I_Flags: LongInt; I_Typ: pAnsiChar; I_CC:
    LongInt; I_Ref: pAnsiChar; I_T0: Double;
    I_FI, I_OP: LongInt; I_CR: Single; I_Range: LongInt; Var
    O_OP: LongInt;

```

```

Var O_TCmin, O_TCmax: Double;
Var O_Err: pAnsiChar): LongInt; StdCall; External
'HS51.DLL';

```

6.4 Function CopyThresholds

Minimum and maximum condensing temperature with refrigerant and evaporation temperature given

Exported function of HS51.DLL: CopyThresholds		
Input parameters		
I_Flags	LongInt	preset data (see chapter 6.7)
I_Typ	pChar	compressor type (see chapter 13)
I_CC	LongInt	0 - <i>reserved for future use</i>
I_Ref	pChar	refrigerant (see chapter 13)
I_T0	Double	evaporation temperature in °C or °F
I_FI	LongInt	frequency inverter: 0=without, 1=integrated, 2=external
I_OP	LongInt	operating mode (see chapter 6.8)
I_CR ¹⁸	Single	100 – <i>reserved for future use (capacity control step in %)</i>
I_Range	LongInt	0: application limits of compressor 1: calculation limits without range „data on request“
Output parameters		
O_OP	LongInt	operating mode (see chapter 6.8)
O_TCmin	Double	minimum condensing temperature in °C or °F
O_TCmax	Double	maximum condensing temperature in °C or °F
O_Err	pChar	supplement to error message, filled with spaces on the right
O_SzErr	LongInt	length of O_Err without spaces
CopyThresholds	LongInt	error message (see chapter 1.3)

Temperatures O_TCmin and O_TCmax are dew point temperatures.

Declaration with Borland Delphi® since version 2009:

```

Function CopyThresholds(I_Flags: LongInt; I_Typ: pAnsiChar; I_CC:
    LongInt; I_Ref: pAnsiChar;
    I_T0: Double; I_OP, I_FI: LongInt; I_CR: Single; I_Range:
    LongInt;
    Var O_OP: LongInt; Var O_TCmin, O_TCmax: Double;
    O_Err: pAnsiChar; Var O_SzErr: LongInt): LongInt; StdCall;
External 'HS51.DLL';

```

Buffer variable in calling program:

```

Var
    ErrorBuf: AnsiString;

```

Initialization:

```

SetLength(ErrorBuf, 20);
O_Err:=@ErrorBuf[1]; or: O_Err:=pAnsiChar(ErrorBuf);

```

Declaration with Microsoft Visual Basic®:

```

Declare Function CopyThresholds Lib "HS51.DLL" _
    (ByVal I_Flags As Long, ByVal I_Typ As String, ByVal I_CC As
    Long, _
    ByVal I_Ref As String, ByVal I_T0 As Double, ByVal I_OP As
    Long, ByVal I_FI As Long, _
    ByVal I_CR As Single, ByVal I_Range As Long, _
    ByRef O_OP As Long, ByRef O_TCmin As Double, ByRef O_TCmax
    As Double, _
    ByVal O_Err As String, ByRef O_SzErr As Long) As Long

```

Puffervariable im aufrufenden Programm:

```
Dim O_Err As String * 20
```

6.5 Function TechData

Technical data of compressors

Exported function of HS51.DLL: TechData		
Input parameters		
I_Flags	LongInt	preset data (see chapter 6.7)
I_Typ	pChar	compressor type (see chapter 13)
I_CC	LongInt	0 - <i>reserved for future use</i>
I_NET	LongInt	three-digit motor index (see chapter 13) I_NET = 100: 50 Hz operation, I_NET = 200 400: 60 Hz operation
I_FCF	Double	selected FI frequency in Hz
Output parameters		
O_PC	Single	maximum power consumption in kW
O_SMT	Single	acoustic power level at middle temperature conditions in dB
O_SLT	Single	acoustic power level at low temperature conditions in dB
TechData	LongInt	error message (see chapter 1.3)

Declaration with Borland Delphi® since version 2009:

```

Function TechData(I_Flags: LongInt; I_Typ: pAnsiChar; I_CC, I_NET:
    LongInt;
    Var O_PC, O_SMT, O_SLT: Single):
    LongInt; StdCall; External 'HS51.DLL';

```

Declaration with Microsoft Visual Basic®:

```

Declare Function TechData Lib "HS51.DLL" _
    (ByVal I_Flags As Long, ByVal I_Typ As String, ByVal I_CC As
    Long, _
    ByVal I_Net As Long, ByVal I_FCF As Double, _
    ByRef O_PC As Single, ByRef O_SMT As Single, _
    ByRef O_SLT As Single) As Long

```

6.6 Function LiquidTemps

Liquid temperature with/without subcooler

Exported function of HS51.DLL: LiquidTemps		
Input parameters		
I_RPath	pChar	path of refrigerant fluid files *.REF ('ASEREP')
I_Flags	LongInt	preset data (see chapter 6.7)
I_Serie	LongInt	compressor series (reserved for future use)
I_Typ	pChar	compressor type (see chapter 13)
I_CC	LongInt	0 - reserved for future use
I_Ref	pChar	refrigerant (see chapter 13)
I_T0	Double	evaporation temperature in °C or °F
I_TC	Double	condensing temperature in °C or °F
I_TS	Double	suction gas temperature in °C/ °F or superheat i K/ °F dependent on I_Flags
I_NET	LongInt	three-digit motor index (see chapter 13) I_NET = 100: 50 Hz operation, I_NET = 200 400: 60 Hz operation
I_FI	LongInt	frequency inverter: 0 = without FI, 1 = internal FI, 2 = external (reserved for future use)
I_CR	Single	capacity control step in % resp. frequency in % (reserved for future use)
Output parameters		
O_TCub	Double	condensing temperature: boiling point in °C or °F = maximum liquid temperature with normal operation
O_TUmin	Double	minimum liquid temperature with subcooler in °C or °F
O_TUopt ²⁴	Double	recommended liquid temperature with subcooler in °C or °F
O_TUmax	Double	maximum liquid temperature with subcooler in °C or °F
O_TEmin	Double	minimum saturated ECONOMISER temperature in °C or °F
LiquidTemps	LongInt	error message (see chapter 1.3)

Declaration with Borland Delphi® since version 2009:

```
Function LiquidTemps(I_RPath: pAnsiChar; I_Flags, I_Serie:
    LongInt; I_Typ: pAnsiChar; I_CC: Long;
    I_Ref: pAnsiChar; I_T0, I_TC, I_TS: Double; I_NET, I_FI:
    LongInt;
    I_CR: Single
    Var O_TCub, O_TUmin, O_TUopt, O_TUmax, O_TEmin: Double):
    LongInt; StdCall; External 'HS51.DLL';
```

Declaration with Microsoft Visual Basic®:

```
Declare Function LiquidTemps Lib "HS51.DLL" _
    (ByVal I_RPath As String, ByVal I_Flags As Long, ByVal
    I_Serie As Long, _
    ByVal I_Typ As String, ByVal I_CC As Long, ByVal I_Ref As
    String, _
    ByVal I_T0 As Double, ByVal I_TC As Double, ByVal I_TS As
    Double, _
    ByVal I_Net As Long, ByVal I_FI As Long, ByVal I_CR As
    Single, _
    ByRef O_TCub As Double, ByRef O_TUmin As Double, ByRef
    O_TUopt As Double, _
    ByRef O_TUmax As Double, ByRef O_TEmin As Double) As Long
```

6.7 Allowed values of I_Flags

Value	Constant	Meaning	
1	CalcWithIPUnits	0	SI units
		1	IP units
2	CalcWithCapacity	0	compressor type given
		2	capacity given
4	CalcWithSuperheat	0	input suction gas temperature
		4	input suction superheat
8	CalcWithUsefulSuperheat	0	ignore useful superheat
		8	input useful superheat
16	CalcWithSubcooling	0	input liquid temperature
		16	input liquid subcooling
32	CalcWithSubcooler	0	without subcooler
		32	with subcooler
64	CalcWithSeaWater	0	
		64	reserved
128	CalcWithMiddleTemp	0	based on dew point temperatures
		128	based on mean temperatures
256	CalcWithFan	0	
		256	reserved
512	CalcWith Tandem	0	
		512	reserved
16384	CalcWithExpansion	0	
		16384	reserved
32768	CalcWithLPDrop	0	
		32768	reserved
65536	CalcWithHPDrop	0	
		65536	reserved
131072	CalcWithEcoStar	0	
		131072	reserved
262144	CalcWithHeatPump	0	
		262144	reserved

6.8 Allowed values of I_OP

0	automatic selection of operating mode - not realized so far
1	standard operating mode
2	ECONOMIZER operation, liquid temperature in subcooler specified by user
3	ECONOMIZER operation, liquid temperature in subcooler specified automatic by program

6.9 Allowed values of I_CR

Compressors	CR capacity control steps (%)
all Types	100, 75, 50

¹⁸ only interpreted if type given

¹⁹ frequency inverter operation; parameters I_NET, I_DS and I_OV are ignored

²⁰ operating mode 1 (standard) and external oil cooling: without liquid subcooling

²¹ with liquid subcooling, without ECO-subcooling

²² external oil cooling (I_TOC ≠ 1)

²³ liquid injection LI (I_TOC = 1)

²⁴ $O_TUopt = t_{eco} + 10K$ resp. $O_TUopt = t_{eco} + 20°F$

7 Semi-hermetic compact screws CS(V)H- and CS(V)W-series ("CS") → HCS51.DLL

Attention! For calculation ASEREP32.DLL and BNP50.DLL have to be in the same directory as HCS51.DLL.

Calling convention "stdCall" in Delphi-Pascal corresponds to "__stdcall" in C++

7.1 Function Design

Performance data for a given compressor type respectively

selection of maximum two compressor types with capacity given

Exported function of HCS51.DLL: Design		
Input parameters		
I_RPath	pChar	path of refrigerant fluid files *.REF ('ASEREP')
I_NPath	pChar	path of name plate data files BNPB*.DAT
I_Flags	LongInt	preset data (see chapter 7.7)
I_Serie ²⁵	LongInt	compressor series 1 (CSH) or 2 (CSW) or 8192 (CSHP)
I_Typ	pChar	compressor type (see chapter 13)
I_CC	LongInt	0 - <i>reserved for future use</i>
I_Ref	pChar	refrigerant (see chapter 13)
I_Q	Double	cooling capacity in kW or kBtu/h
I_T0	Double	evaporation temperature in °C or °F
I_TC	Double	condensing temperature in °C or °F
I_TS	Double	suction gas temperature in °C / °F or superheat in K / °F dependent on I_Flags
I_TL	Double	operating mode 1 (standard): liquid temperature in °C / °F or sub-cooling in K / °F dependent on I_Flags operating mode 2 or 3 (ECO): I_TL is ignored, calculation without liquid subcooling
I_TM	LongInt	only operating mode 2 (ECO): kind of I_TLC (subcooler temperature)
I_TLC	Double	only operating mode 2 (ECO): I_TM = 0: liquid temperature in °C or °F I_TM = 1: liquid subcooling in K or °F I_TM = 2: temp. diff. between subcooler and ECO temperature in K or °F
I_TOC ²⁶	LongInt	<i>oil cooling</i> I_TOC = 1: liquid injection LI with temperature I_TOL I_TOC = 2: external oil cooling with temperature I_TOL else: liquid injection LI with maximum oil temperature
I_TOL ²⁶	Double	<i>oil temperature in °C or °F (only I_TOC = 1 2)</i> max. 120 °F (248 °F), recommended 90-110 °C (194-230 °F)
I_TN	Double	useful superheat in K or °F
I_NET	LongInt	three-digit motor index (see chapter 13)
I_DS ²⁷	LongInt	motor winding type: 1 = delta, 2 = star, 3 = part winding, 4 = asynchronous (see chapter 13)
I_OV ²⁷	LongInt	operating voltage (see chapter 13)
I_FI	LongInt	frequency inverter: 0 = without FI, 1 = internal FI
I_FCV ²⁸	LongInt	supply voltage in V (400 or 460)
I_FCOF ²⁸	LongInt	supply frequency in Hz (50 or 60)
I_OP	LongInt	operating mode (see chapter 7.8)
I_CR ^{27 29}	Single	<i>capacity control step in % resp. frequency in %</i>

Exported function of HCS51.DLL: Design		
Output parameters		
O_T1, O_T2	pChar	two selected compressor types
O_OP1, O_OP2	LongInt	operating mode (see chapter 7.8)
O_CR1, O_CR2 ²⁸	Single	frequency in %
O_Q1, O_Q2	Double	cooling capacity in kW or kBtu/h
O_Qmin1, O_Qmin2 ²⁸	Double	minimum cooling capacity in kW or kBtu/h
O_Qmax1, O_Qmax2 ²⁸	Double	maximum cooling capacity in kW or kBtu/h
O_QU1, O_QU2	Double	evaporator capacity in kW or kBtu/h
O_QN1, O_QN2 ³⁰	Double	cooling capacity at standard operating conditions
O_QC1, O_QC2 ³¹	Double	condenser capacity without heat rejection in kW or kBtu/h
O_QH1, O_QH2 ³¹	Double	condenser capacity minus heat rejection in kW or kBtu/h
O_P1, O_P2	Double	power consumption in kW
O_I1, O_I2	Double	current in A
O_COS1, O_COS2	Double	power factor cos PHI
O_E1, O_E2	Double	COP (dimensionless) or EER in Btu/h/W
O_EN1, O_EN2 ³⁰	Double	COP / EER at standard operating conditions
O_VG1, O_VG2	Double	geometric displacement in m ³ /h or ft ³ /h
O_M1, O_M2	Double	HP mass flow in kg/h or lb/h
O_ME1, O_ME2	Double	ECO mass flow in kg/h or lb/h
O_QS1, O_QS2	Double	subcooler capacity in kW or kBtu/h
O_TE1, O_TE2	Double	saturated ECONOMISER temperature in °C or °F
O_PE1, O_PE2	Double	ECONOMISER pressure in bara or psia
O_TL1, O_TL2	Double	liquid temperature in °C or °F operating mode 1: behind condenser operating mode 2 or 3 (ECO): behind subcooler
O_TH1, O_TH2	Double	hot gas temperature (uncooled) in °C or °F
O_QA1, O_QA2 ²⁶	Double	additional cooling in kW or kBtu/h
O_VOL1, O_VOL2	Double	oil volume flow in m ³ /h or US gpm
O_TOL1, O_TOL2 ²⁶	Double	oil cooler outlet temperature in °C or °F
O_TJ1, O_TJ2 ²⁶	Double	liquid injection temperature in °C or °F
O_PJ1, O_PJ2 ³⁰	Double	liquid injection pressure in bara or psia
O_Hint1, O_Hint2, O_Hint3	LongInt	hint(s) (see chapter 1.4 and 1.5)
O_Err	pChar	supplement to error message
Design	LongInt	error message (see chapter 1.3)

Declaration with Borland Delphi® since version 2009:

```

Function Design(I_RPath, I_NPath: pAnsiChar; I_Flags, I_Serie:
    LongInt; I_Typ: pAnsiChar;
    I_CC: LongInt; I_Ref: PAnsiChar; I_Q, I_T0, I_TC, I_TS,
    I_TL: Double;
    I_TM: LongInt; I_TLC: Double; I_TOC: LongInt; I_TOL,
    I_TN: Double;
    I_NET, I_DS, I_OV, I_FI, I_FCV, I_FCOF, I_OP: LongInt; I_CR:
    Single;
    Var O_T1, O_T2: pAnsiChar; Var O_OP1, O_OP2: LongInt;
    Var O_CR1, O_CR2: Single;
    Var O_Q1, O_Q2, O_Qmin1, O_Qmin2, O_Qmax1, O_Qmax2, O_QU1,
    O_QU2, O_QN1, O_QN2, O_QC1, O_QC2, O_QH1, O_QH2, O_P1, O_P2,
    O_I1, O_I2, O_COS1, O_COS2, O_E1, O_E2, O_EN1, O_EN2, O_VG1,
    O_VG2, O_M1, O_M2, O_ME1, O_ME2, O_QS1, O_QS2, O_TE1, O_TE2,
    O_PE1, O_PE2, O_TL1, O_TL2, O_TH1, O_TH2, O_QA1, O_QA2,
    O_VOL1, O_VOL2, O_TOL1, O_TOL2, O_TJ1, O_TJ2, O_PJ1, O_PJ2:
    Double;

```

```
Var O_Hint1, O_Hint2, O_Hint3: LongInt; Var O_Err:
pAnsiChar): LongInt; StdCall; External 'HCS51.DLL';
```

7.2 Function CopyDesign

Performance data for a given compressor type respectively

selection of maximum two compressor types with capacity given

Exported function of HCS51.DLL: CopyDesign		
Input parameters		
I_RPath	pChar	path of refrigerant fluid files *.REF ('ASEREP')
I_NPath	pChar	path of name plate data files BNPB*.DAT
I_Flags	LongInt	preset data (see chapter 7.7)
I_Serie ²⁵	LongInt	compressor series 1 (CSH) or 2 (CSW)
I_Typ	pChar	compressor type (see chapter 13)
I_CC	LongInt	0 - reserved for future use
I_Ref	pChar	refrigerant (see chapter 13)
I_Q	Double	cooling capacity in kW or kBtu/h
I_T0	Double	evaporation temperature in °C or °F
I_TC	Double	condensing temperature in °C or °F
I_TS	Double	suction gas temperature in °C / °F or superheat in K / °F dependent on I_Flags
I_TL	Double	operating mode 1 (standard): liquid temperature in °C / °F or sub-cooling in K / °F dependent on I_Flags operating mode 2 or 3 (ECO): I_TL is ignored, calculation without liquid subcooling
I_TM	LongInt	only operating mode 2 (ECO): kind of I_TLC (subcooler temperature)
I_TLC	Double	only operating mode 2 (ECO): I_TM = 0: liquid temperature in °C or °F I_TM = 1: liquid subcooling in K or °F I_TM = 2: temp. diff. between subcooler and ECO temperature in K or °F
I_TOC ²⁶	LongInt	oil cooling I_TOC = 1: liquid injection LI with temperature I_TOL I_TOC = 2: external oil cooling with temperature I_TOL else: liquid injection LI with maximum oil temperature
I_TOL ²⁶	Double	oil temperature in °C or °F (only I_TOC = 1 2) max. 120 °F (248 °F), recommended 90-110 °C (194-230 °F)
I_TN	Double	useful superheat in K or °F
I_NET	LongInt	three-digit motor index (see chapter 13)
I_DS ²⁷	LongInt	motor winding type: 1 = delta, 2 = star, 3 = part winding, 4 = asynchronous (see chapter 13)
I_OV ²⁷	LongInt	operating voltage (see chapter 13)
I_FI	LongInt	frequency inverter: 0 = without FI, 1 = internal FI
I_FCV ²⁸	LongInt	supply voltage in V (400 or 460)
I_FCOF ²⁸	LongInt	supply frequency in Hz (50 or 60)
I_OP	LongInt	operating mode (see chapter 7.8)
I_CR ^{27 29}	Single	capacity control step in % resp. frequency in %
Output parameters		
O_T1	pChar	first selected compressor type, filled with spaces on the right
O_SzT1	LongInt	length of O_T1 without spaces
O_T2	pChar	second selected compressor type, filled with spaces on the right
O_SzT2	LongInt	length of O_T2 without spaces
DesignData	TDesignData	see below
O_Hint1, O_Hint2, O_Hint3	LongInt	hint(s) (see chapter 1.4 and 1.5)

Exported function of HCS51.DLL: CopyDesign		
O_Err	pChar	supplement to error message, filled with spaces on the right
O_SzErr	LongInt	length of O_Err without spaces
CopyDesign	LongInt	error message (see chapter 1.3)
Data fields of array DesignData		
O_OP1, O_OP2	LongInt	operating mode (see chapter 7.8)
O_CR1, O_CR2 ²⁸	Single	frequency in %
O_Q1, O_Q2	Double	cooling capacity in kW or kBtu/h
O_Qmin1, O_Qmin2 ²⁸	Double	minimum cooling capacity in kW or kBtu/h
O_Qmax1, O_Qmax2 ²⁸	Double	maximum cooling capacity in kW or kBtu/h
O_QU1, O_QU2	Double	evaporator capacity in kW or kBtu/h
O_QN1, O_QN2 ³⁰	Double	cooling capacity at standard operating conditions
O_QC1, O_QC2 ³¹	Double	condenser capacity without heat rejection in kW or kBtu/h
O_QH1, O_QH2 ³¹	Double	condenser capacity minus heat rejection in kW or kBtu/h
O_P1, O_P2	Double	power consumption in kW
O_I1, O_I2	Double	current in A
O_COS1, O_COS2	Double	power factor cos PHI
O_E1, O_E2	Double	COP (dimensionless) or EER in Btu/h/W
O_EN1, O_EN2 ³⁰	Double	COP / EER at standard operating conditions
O_VG1, O_VG2	Double	geometric displacement in m ³ /h or ft ³ /h
O_M1, O_M2	Double	HP mass flow in kg/h or lb/h
O_ME1, O_ME2	Double	ECO mass flow in kg/h or lb/h
O_QS1, O_QS2	Double	subcooler capacity in kW or kBtu/h
O_TE1, O_TE2	Double	saturated ECONOMISER temperature in °C or °F
O_PE1, O_PE2	Double	ECONOMISER pressure in bara or psia
O_TL1, O_TL2	Double	liquid temperature in °C or °F operating mode 1: behind condenser operating mode 2 or 3 (ECO): behind subcooler
O_TH1, O_TH2	Double	hot gas temperature (uncooled) in °C or °F
O_QA1, O_QA2 ²⁶	Double	additional cooling in kW or kBtu/h
O_VOL1, O_VOL2	Double	oil volume flow in m ³ /h or US gpm
O_TOL1, O_TOL2 ²⁶	Double	oil cooler outlet temperature in °C or °F
O_TJ1, O_TJ2 ²⁶	Double	liquid injection temperature in °C or °F
O_PJ1, O_PJ2 ³⁰	Double	liquid injection pressure in bara or psia

Declaration with Borland Delphi® since version 2009:

```

Type TDesignData = Record
    O_OP1, O_OP2 : LongInt;
    O_CR1, O_CR2: Single;
    O_Q1, O_Q2 : Double;
    O_Qmin1, O_Qmin2: Double;
    O_Qmax1, O_Qmax2: Double;
    O_QU1, O_QU2 : Double;
    O_QN1, O_QN2 : Double;
    O_QC1, O_QC2 : Double;
    O_QH1, O_QH2 : Double;
    O_P1, O_P2 : Double;
    O_I1, O_I2 : Double;
    O_COS1, O_COS2: Double;
    O_E1, O_E2 : Double;
    O_EN1, O_EN2 : Double;
    O_VG1, O_VG2 : Double;
    O_M1, O_M2 : Double;
    O_ME1, O_ME2 : Double;

```

```
O_QS1, O_QS2 : Double;
O_TE1, O_TE2 : Double;
O_PE1, O_PE2 : Double;
O_TL1, O_TL2 : Double;
O_TH1, O_TH2 : Double;
O_QA1, O_QA2 : Double;
O_VOL1, O_VOL2 : Double;
O_TOL1, O_TOL2 : Double;
O_TJ1, O_TJ2 : Double;
O_PJ1, O_PJ2 : Double;
End;
```

```
Function CopyDesign(I_RPath, I_NPath: pAnsiChar; I_Flags, I_Serie:
    LongInt;
    I_Typ: pAnsiChar; I_CC: LongInt; I_Ref: pAnsiChar;
    I_Q, I_T0, I_TC, I_TS, I_TL: Double; I_TM: LongInt;
    I_TLC: Double; I_TOC: LongInt; I_TOL, I_TN: Double;
    I_NET, I_DS, I_OV, I_FI, I_FCV, I_FCOF, I_OP: LongInt; I_CR:
    Single;
    O_T1: pAnsiChar; Var O_SzT1: LongInt; O_T2: pAnsiChar; Var
    O_SzT2: LongInt;
    Var DesignData: TDesignData; Var O_Hint1, O_Hint2, O_Hint3:
    LongInt;
    O_Err: PAnsiChar; Var O_SzErr: LongInt): LongInt; StdCall;
    External 'HCS51.DLL';
```

Buffer variables in calling program:

```
Var
    Type1Buf, Type2Buf: AnsiString;
    ErrorBuf: AnsiString;
```

Initialization:

```
SetLength(Type1Buf, 30);
SetLength(Type2Buf, 30);
SetLength(ErrorBuf, 20);
O_T1:=@Type1Buf[1]; or: O_T1:=PAnsiChar(Type1Buf);
O_T2:=@Type2Buf[1]; or: O_T2:=PAnsiChar(Type2Buf);
O_Err:=@ErrorBuf[1]; or: O_Err:=PAnsiChar(ErrorBuf);
```

Declaration with Microsoft Visual Basic®:

```
Type TDesignData
    O_OP1 As Long
    O_OP2 As Long
    O_CR1 As Single
    O_CR2 As Single
    O_Q1 As Double
    O_Q2 As Double
```

```

O_Qmin1 As Double
O_Qmin2 As Double
O_Qmax1 As Double
O_Qmax2 As Double
O_QU1 As Double
O_QU2 As Double
O_QN1 As Double
O_QN2 As Double
O_QC1 As Double
O_QC2 As Double
O_QH1 As Double
O_QH2 As Double
O_P1 As Double
O_P2 As Double
O_I1 As Double
O_I2 As Double
O_COS1 As Double
O_COS2 As Double
O_E1 As Double
O_E2 As Double
O_EN1 As Double
O_EN2 As Double
O_VG1 As Double
O_VG2 As Double
O_M1 As Double
O_M2 As Double
O_ME1 As Double
O_ME2 As Double
O_QS1 As Double
O_QS2 As Double
O_TE1 As Double
O_TE2 As Double
O_PE1 As Double
O_PE2 As Double
O_TL1 As Double
O_TL2 As Double
O_TH1 As Double
O_TH2 As Double
O_QA1 As Double
O_QA2 As Double
O_VOL1 As Double
O_VOL2 As Double
O_TOL1 As Double
O_TOL2 As Double
O_TJ1 As Double
O_TJ2 As Double
O_PJ1 As Double
O_PJ2 As Double
End Type

```

```

Declare Function CopyDesign Lib "HCS51.DLL" _
    (ByVal I_RPath As String, ByVal I_NPath As String, ByVal
    I_Flags As Long, _
    ByVal I_Serie As Long, ByVal I_Typ As String, ByVal I_CC As
    Long, _
    ByVal I_Ref As String, ByVal I_Q As Double, ByVal I_T0 As

```

```

Double, _
ByVal I_TC As Double, ByVal I_TS As Double, ByVal I_TL As
Double, _
ByVal I_TM As Long, ByVal I_TLC As Double, ByVal I_TOC As
Long, _
ByVal I_TOL As Double, ByVal I_TN As Double, _
ByVal I_Net As Long, ByVal I_DS As Long, ByVal I_OV As Long,

ByVal I_FI As Long, ByVal I_FCV As Long, ByVal I_FCOF As
Long, _
ByVal I_OP As Long, ByVal I_CR As Single, _
ByVal O_T1 As String, ByRef O_SzT1 As Long, ByVal O_T2 As
String, _
ByRef O_SzT2 As Long, ByRef DesignData As TDesignData, _
ByRef O_Hint1 As Long, ByRef O_Hint2 As Long, ByRef O_Hint3
As Long, _
ByVal O_Err As String, _
ByRef O_SzErr As Long) As Long

```

Buffer variables in calling program:

```

Dim O_T1 As String * 30
Dim O_T2 As String * 30
Dim O_Err As String * 20

```

7.3 Function Thresholds

Minimum and maximum condensing temperature with refrigerant and evaporation temperature given

Exported function of HCS51.DLL: Thresholds		
Input parameters		
I_Flags	LongInt	preset data (see chapter 7.7)
I_Serie	LongInt	compressor series (not used)
I_Typ	pChar	compressor type (see chapter 13)
I_CC	LongInt	0 - reserved for future use
I_Ref	pChar	refrigerant (see chapter 13)
I_T0	Double	evaporation temperature in °C or °F
I_FI	LongInt	frequency inverter: 0 = without FI, 1 = internal FI
I_OP	LongInt	operating mode (see chapter 7.8)
I_CR ²⁹	Single	capacity control step in %
I_Range	LongInt	0: application limits of compressor 1: calculation limits without range „data on request“
Output parameters		
O_OP	LongInt	operating mode (see chapter 7.8)
O_TCmin	Double	minimum condensing temperature in °C or °F
O_TCmax	Double	maximum condensing temperature in °C or °F
O_Err	pChar	supplement to error message
Thresholds	LongInt	error message (see chapter 1.3)

Temperatures O_TCmin and O_TCmax are dew point temperatures.

Declaration with Borland Delphi® since version 2009

```
Function Thresholds(I_Flags, I_Serie: LongInt; I_Typ: pAnsiChar;
  I_CC: LongInt; I_Ref: pAnsiChar;
  I_T0: Double; I_FI, I_OP: LongInt; I_CR: Single; I_Range:
  LongInt;
  Var O_OP: LongInt;
  Var O_TCmin, O_TCmax: Double;
  Var O_Err: pAnsiChar): LongInt; StdCall; External
  'HCS51.DLL';
```

7.4 Function CopyThresholds

Minimum and maximum condensing temperature with refrigerant and evaporation temperature given

Exported function of HCS51.DLL: CopyThresholds		
Input parameters		
I_Flags	LongInt	preset data (see chapter 7.7)
I_Serie	LongInt	compressor series (not used)
I_Typ	pChar	compressor type (see chapter 13)
I_CC	LongInt	0 - <i>reserved for future use</i>
I_Ref	pChar	Refrigerant (see chapter 13)
I_T0	Double	evaporation temperature in °C or °F
I_FI	LongInt	frequency inverter: 0 = without FI, 1 = internal FI
I_OP	LongInt	operating mode (see chapter 7.8)
I_CR ²⁹	Single	capacity control step in %
I_Range	LongInt	0: application limits of compressor 1: calculation limits without range „data on request“
Output parameters		
O_OP	LongInt	operating mode (see chapter 7.8)
O_TCmin	Double	minimum condensing temperature in °C or °F
O_TCmax	Double	maximum condensing temperature in °C or °F
O_Err	pChar	supplement to error message, filled with spaces on the right
O_SzErr	LongInt	length of O_Err without spaces
CopyThresholds	LongInt	error message (see chapter 1.3)

Temperatures O_TCmin and O_TCmax are dew point temperatures.

Declaration with Borland Delphi® since version 2009:

```
Function CopyThresholds(I_Flags, I_Serie: LongInt; I_Typ:
  pAnsiChar; I_CC: LongInt;
  I_Ref: pAnsiChar; I_T0: Double; I_FRI, I_OP: LongInt; I_CR:
  Single; I_Range: LongInt;
  Var O_OP: LongInt;
  Var O_TCmin, O_TCmax: Double;
  O_Err: pAnsiChar; Var O_SzErr: LongInt): LongInt; StdCall;
  External 'HCS51.DLL';
```

Buffer variable in calling program:

```
Var
  ErrorBuf: AnsiString;
```

Initialization:

```
SetLength(ErrorBuf, 20);
O_Err:=@ErrorBuf[1]; or: O_Err:=pAnsiChar(ErrorBuf);
```

Declaration with Microsoft Visual Basic®:

```
Declare Function CopyThresholds Lib "HCS51.DLL" _
    (ByVal I_Flags As Long, ByVal I_Serie As Long, ByVal I_Typ
    As String, _
    ByVal I_CC As Long, ByVal I_Ref As String, ByVal I_T0 As
    Double, _
    ByVal I_FI As Long, ByVal I_OP As Long, ByVal I_CR As
    Single, _
    ByVal I_Range As Long, _
    ByRef O_OP As Long, ByRef O_TCmin As Double, ByRef O_TCmax
    As Double, _
    ByVal O_Err As String, ByRef O_SzErr As Long) As Long
```

Buffer variable in calling program:

```
Dim O_Err As String * 20
```

7.5 Function TechData

Technical data of compressors

Exported function of HCS51.DLL: TechData		
Input parameters		
I_Flags	LongInt	preset data (see chapter 7.7)
I_Serie	LongInt	compressor series (not used)
I_Typ	pChar	compressor type (see chapter 13)
I_CC	LongInt	0 - <i>reserved for future use</i>
I_NET	LongInt	three-digit motor index (see chapter 13) I_NET = 100: 50 Hz operation, I_NET = 200 400: 60 Hz operation
Output parameters		
O_PC	Single	maximum power consumption in kW
O_SMT	Single	acoustic power level at middle temperature conditions in dB
O_SLT	Single	acoustic power level at low temperature conditions in dB
TechData	LongInt	error message (see chapter 1.3)

Declaration with Borland Delphi® since version 2009:

```
Function TechData(I_Flags, I_Serie: LongInt; I_Typ: pAnsiChar;
    I_CC, I_NET: LongInt;
    Var O_PC, O_SMT, O_SLT: Single):
    LongInt; StdCall; External 'HCS51.DLL';
```

Declaration with Microsoft Visual Basic®:

```
Declare Function TechData Lib "HCS51.DLL" _
    (ByVal I_Flags As Long, ByVal I_Serie As Long, ByVal I_Typ
```

```

As String, _
ByVal I_CC As Long, ByVal I_NET As Long, _
ByRef O_PC As Single, ByRef O_SMT As Single, _
ByRef O_SLT As Single) As Long

```

7.6 Function LiquidTemps

Liquid temperature with/without subcooler

Exported function of HCS51.DLL: LiquidTemps		
Input parameters		
I_RPath	pChar	path of refrigerant fluid files *.REF ('ASEREP')
I_Flags	LongInt	preset data (see chapter 7.7)
I_Serie ²⁵	LongInt	compressor series 1 (CSH) or 2 (CSW)
I_Typ	pChar	compressor type (see chapter 13)
I_CC	LongInt	0 - reserved for future use
I_Ref	pChar	refrigerant (see chapter 13)
I_T0	Double	evaporation temperature in °C or °F
I_TC	Double	condensing temperature in °C or °F
I_TS	Double	suction gas temperature in °C/ °F or superheat i K/ °F dependent on I_Flags
I_NET	LongInt	three-digit motor index (see chapter 13) I_NET = 100: 50 Hz operation, I_NET = 200 400: 60 Hz operation
I_FI	LongInt	frequency inverter: 0 = without FI, 1 = internal FI
I_CR ²⁹	Single	capacity control step in % resp. frequency in % – only CSVH series –
Output parameters		
O_TCbub	Double	condensing temperature: boiling point in °C or °F = maximum liquid temperature with normal operation
O_TUmin ²⁶	Double	minimum liquid temperature with subcooler in °C or °F
O_TUopt ^{32 26}	Double	recommended liquid temperature with subcooler in °C or °F
O_TUmax ²⁶	Double	maximum liquid temperature with subcooler in °C or °F
O_TEmin ²⁶	Double	minimum saturated ECONOMISER temperature in °C or °F
LiquidTemps	LongInt	error message (see chapter 1.3)

Declaration with Borland Delphi® since version 2009:

```

Function LiquidTemps(I_RPath: pAnsiChar; I_Flags, I_Serie:
    LongInt; I_Typ: pAnsiChar;
    I_CC: Long; I_Ref: pAnsiChar; I_T0, I_TC, I_TS: Double;
    I_NET, I_FI: LongInt;
    I_CR: Single;
    Var O_TCbub, O_TUmin, O_TUopt, O_TUmax, O_TEmin: Double):
    LongInt; StdCall; External 'HCS51.DLL';

```

Declaration with Microsoft Visual Basic®:

```

Declare Function LiquidTemps Lib "HCS51.DLL" _
    (ByVal I_RPath As String, ByVal I_Flags As Long, ByVal
    I_Serie As Long, _
    ByVal I_Typ As String, ByVal I_CC As Long, ByVal I_Ref As
    String, _
    ByVal I_T0 As Double, ByVal I_TC As Double, ByVal I_TS As
    Double, _
    ByVal I_NET As Long, ByVal I_FI As Long, ByVal I_CR As

```

```
Single _
ByRef O_TCbub As Double, ByRef O_TUmin As Double, _
ByRef O_TUopt As Double, ByRef O_TUmax As Double, _
ByRef O_TEmin As Double) As Long
```

7.7 Allowed values of I_Flags

Value	Constant	Meaning	
1	CalcWithIPUnits	0	SI units
		1	IP units
2	CalcWithCapacity	0	compressor type given
		2	capacity given
4	CalcWithSuperheat	0	input suction gas temperature
		4	input suction superheat
8	CalcWithUsefulSuperheat	0	ignore useful superheat
		8	input useful superheat
16	CalcWithSubcooling	0	input liquid temperature
		16	input liquid subcooling
32	CalcWithSubcooler	0	without subcooler
		32	with subcooler
64	CalcWithSeaWater	0	
		64	reserved
128	CalcWithMiddleTemp	0	based on dew point temperatures
		128	based on mean temperatures
256	CalcWithFan	0	
		256	reserved
512	CalcWith Tandem	0	
		512	reserved
16384	CalcWithExpansion	0	
		16384	reserved
32768	CalcWithLPDrop	0	
		32768	reserved
65536	CalcWithHPDrop	0	
		65536	reserved
131072	CalcWithEcoStar	0	
		131072	reserved
262144	CalcWithHeatPump	0	
		262144	reserved

7.8 Allowed values of I_OP

0	automatic selection of operating mode - not realized so far
1	standard operating mode
2	ECONOMISER operation, liquid temperature in subcooler specified by user
3	ECONOMISER operation, liquid temperature in subcooler specified automatic by program

²⁵ only interpreted if capacity given

²⁶ only CSH-series

²⁷ only interpreted if type given

²⁸ frequency inverter operation parameters I_NET, I_DS, and I_OV are ignored

²⁹ Leistungsregler Stufe in %, bei Leistungsvorgabe nur 100, sonst

Baureihe CSH: 25/ 50/ 75/ 100 im OEM- oder BIM-Modus, Eco-Betrieb nur im BIM-Modus

Baureihe CSW2: 25/ 50 /75/ 100, Eco-Betrieb nur 100

Baureihe CSH.6: 25/ 50/ 75/ 100, Eco-Betrieb nur im BIM-Modus

bei Frequenzumrichterbetrieb:

CSVH24-125: 25 ... 100, CSVH25-160: 20 ... 100, CSVH26-200: 16 ... 100

CSVW24-125M: 25 ... 100, CSVW25-160M: 20 ... 100, CSVW26-200M: 16 ... 100

³⁰ operating mode 1 (standard): without liquid subcooling

³¹ with liquid subcooling, without ECO-subcooling

³² $O_TU_{opt} = t_{eco} + 10K$ resp. $O_TU_{opt} = t_{eco} + 20^{\circ}F$

8 Open drive screws ("OS") → OS50.DLL

Attention! For calculation ASEREP32.DLL has to be in the same directory as OS50.DLL.

Calling convention "register" in Delphi-Pascal corresponds to "__fastcall" in C++

8.1 Function SpeedCheck

Minimum and maximum speed for a given compressor type

Exported function of OS50.DLL: SpeedCheck		
Input parameters		
I_Typ	pChar	compressor type (see chapter 13)
I_CC	LongInt	0 – reserved for future use
Output parameters		
O_RPmin	Single	minimum compressor speed in min ⁻¹
O_RPmax	Single	maximum compressor speed in min ⁻¹
SpeedCheck	LongInt	error message (see chapter 1.3)

Declaration with Borland Delphi® since version 2009:

```
Function SpeedCheck(I_Typ: pAnsiChar; I_CC: LongInt; Var O_RPmin,
    O_RPmax: Single):
    LongInt; StdCall; External 'OS50.DLL';
```

Declaration with Microsoft Visual Basic®:

```
Declare Function SpeedCheck Lib "OS50.DLL" _
    (ByVal I_Typ As String, ByVal I_CC As Long, ByRef O_RPmin As
    Single, _
    ByRef O_RPmax As Single) As Long
```

8.2 Function Design

Performance data for a given compressor type respectively

selection of maximum two compressor types with capacity given

Exported procedure of OS50.DLL: Design		
Input parameters		
I_RPath	pChar	path of refrigerant fluid files *.REF ('ASEREP')
I_Flags	LongInt	preset data (see chapter 8.9)
I_Typ	pChar	compressor type (see chapter 13)
I_CC	LongInt	0 - reserved for future use
I_Ref	pChar	refrigerant (see chapter 13)
I_Q	Double	cooling capacity in kW or kBtu/h
I_T0	Double	evaporation temperature in °C or °F
I_TC	Double	condensing temperature in °C or °F
I_TS	Double	suction gas temperature in °C / °F or superheat in K / °F dependent on I_Flags

Exported procedure of OS50.DLL: Design		
I_TL	Double	operating mode 1 (standard): liquid temperature in °C / °F or sub-cooling in K / °F dependent on I_Flags operating mode 2 or 3 (ECO): I_TL is ignored, calculation without liquid subcooling
I_TM	LongInt	only operating mode 2 (ECO): kind of I_TLC (subcooler temperature)
I_TLC	Double	only operating mode 2 (ECO): I_TM = 0: liquid temperature in °C or °F I_TM = 1: liquid subcooling in K or °F I_TM = 2: temp. diff. between subcooler and ECO temperature in K or °F
I_TOC	LongInt	Oil cooling: 0 = auto calculation 2,3 = external oil cooling
I_TOL	Double	I_TOC=2: hot gas temperature in °C bzw. °F I_TOC=3: oil injection temperature in °C bzw. °F
I_TN	Double	useful superheat in K or °F
I_OP	LongInt	operating mode (see chapter 8.11)
I_SP	Single	Compressor speed in min ⁻¹ (only 2900 or 3500 min ⁻¹ allowed)
I_CR ³³	Single	100 – reserved for future use (capacity control step in %)
Output parameters		
O_T1, O_T2	pChar	two selected compressor types
O_OP1, O_OP2	LongInt	operating mode (see chapter 8.11)
O_Q1, O_Q2	Double	cooling capacity in kW or kBtu/h
O_QU1, O_QU2	Double	evaporator capacity in kW or kBtu/h
O_QN1, O_QN2 ³⁴	Double	cooling capacity at standard operating conditions
O_QC1, O_QC2 ³⁵	Double	condenser capacity without heat rejection in kW or kBtu/h
O_QH1, O_QH2 ³⁵	Double	condenser capacity minus heat rejection in kW or kBtu/h
O_P1, O_P2	Double	power consumption in kW
O_E1, O_E2	Double	COP (dimensionless) or EER in Btu/h/W
O_EN1, O_EN2 ³⁴	Double	COP / EER at standard operating conditions
O_VG1, O_VG2	Double	geometric displacement in m ³ /h or ft ³ /h
O_MT1, O_MT2	Single	necessary driving motor in kW
O_M1, O_M2	Double	HP mass flow in kg/h or lb/h
O_ME1, O_ME2	Double	ECO resp. LI mass flow in kg/h or lb/h
O_QS1, O_QS2	Double	subcooler capacity in kW or kBtu/h
O_TE1, O_TE2	Double	saturated ECONOMISER temperature in °C or °F
O_PE1, O_PE2	Double	ECONOMISER pressure in bara or psia
O_TL1, O_TL2	Double	liquid temperature in °C or °F operating mode 1: behind condenser operating mode 2 or 3 (ECO): behind subcooler
O_TH1, O_TH2	Double	hot gas temperature (uncooled) in °C or °F
O_THC1, O_THC2	Double	hot gas temperature (cooled) in °C or °F
O_QA1, O_QA2	Double	additional cooling in kW or kBtu/h
O_VOL1, O_VOL2	Double	oil volume flow in m ³ /h or US gpm
O_TOL1, O_TOL2 ³⁶	Double	oil cooler outlet temperature in °C or °F
O_TJ1, O_TJ2 ³⁷	Double	liquid injection temperature in °C or °F
O_PJ1, O_PJ2 ³⁷	Double	liquid injection pressure in bara or psia
O_Hint1, O_Hint2	LongInt	hint(s) (see chapter 1.4 and 1.5)
O_Err	pChar	supplement to error message
Design	LongInt	error message (see chapter 1.3)

Declaration with Borland Delphi® since version 2009:

```
Function Design(I_RPath: pAnsiChar; I_Flags: LongInt; I_Typ:
    pAnsiChar; I_CC: LongInt;
    I_Ref: pAnsiChar; I_Q, I_T0, I_TC, I_TS, I_TL: Double; I_TM:
```

```

LongInt; I_TLC: Double;
I_TOC: LongInt; I_TOL, I_TN: Double; I_OP: LongInt; I_SP,
I_CR: Single;
Var O_T1, O_T2: pAnsiChar; Var O_OP1, O_OP2: LongInt;
Var O_Q1, O_Q2, O_QU1, O_QU2, O_QN1, O_QN2, O_QC1, O_QC2,
O_QH1, O_QH2, O_P1, O_P2, O_E1, O_E2, O_EN1, O_EN2,
O_VG1, O_VG2: Double; O_MT1, O_MT2: Single;
O_M1, O_M2, O_ME1, O_ME2, O_QS1, O_QS2, O_TE1, O_TE2,
O_PE1, O_PE2, O_TL1, O_TL2, O_TH1, O_TH2, O_THC1, O_THC2,
O_QA1, O_QA2, O_VOL1, O_VOL2,
O_TOL1, O_TOL2, O_TJ1, O_TJ2, O_PJ1, O_PJ2: Double;
Var O_Hint1, O_Hint2: LongInt; Var O_Err: pAnsiChar):
LongInt; StdCall; External 'OS50.DLL';

```

8.3 Function CopyDesign

Performance data for a given compressor type respectively

selection of maximum two compressor types with capacity given

Exported function of OS50.DLL: CopyDesign		
Input parameters		
I_RPath	pChar	path of refrigerant fluid files *.REF ('ASEREP')
I_Flags	LongInt	preset data (see chapter 13)
I_Typ	pChar	compressor type (see chapter 13)
I_CC	LongInt	0 - <i>reserved for future use</i>
I_Ref	pChar	refrigerant (see chapter 13)
I_Q	Double	cooling capacity in kW or kBTu/h
I_T0	Double	evaporation temperature in °C or °F
I_TC	Double	condensing temperature in °C or °F
I_TS	Double	suction gas temperature in °C / °F or superheat in K / °F dependent on I_Flags
I_TL	Double	operating mode 1 (standard): liquid temperature in °C / °F or sub-cooling in K / °F dependent on I_Flags operating mode 2 or 3 (ECO): I_TL is ignored, calculation without liquid subcooling
I_TM	LongInt	only operating mode 2 (ECO): kind of I_TLC (subcooler temperature)
I_TLC	Double	only operating mode 2 (ECO): I_TM = 0: liquid temperature in °C or °F I_TM = 1: liquid subcooling in K or °F I_TM = 2: temp. diff. between subcooler and ECO temperature in K or °F
I_TOC	LongInt	Oil cooling: 0 = auto calculation 2,3 = external oil cooling
I_TOL	Double	I_TOC=2: hot gas temperature in °C bzw. °F I_TOC=3: oil injection temperature in °C bzw. °F
I_TN	Double	useful superheat in K or °F
I_OP	LongInt	operating mode (see chapter 8.11)
I_SP	Single	Compressor speed in min ⁻¹ (only 2900 or 3500 min ⁻¹ allowed)
I_CR ³³	Single	100 – <i>reserved for future use (capacity control step in %)</i>
Output parameters		
O_T1	pChar	first selected compressor type, filled with spaces on the right
O_SzT1	LongInt	length of O_T1 without spaces
O_T2	pChar	second selected compressor type, filled with spaces on the right
O_SzT2	LongInt	length of O_T2 without spaces
DesignData	TDesignData	see below

Exported function of OS50.DLL: CopyDesign		
O_Hint1, O_Hint2	LongInt	hint(s) (see chapter 1.4 and 1.5)
O_Err	pChar	supplement to error message
O_SzErr	LongInt	length of O_Err without spaces
CopyDesign	LongInt	error message (see chapter 1.3)
Data fields of array DesignData		
O_OP1, O_OP2	LongInt	operating mode (see chapter 8.11)
O_Q1, O_Q2	Double	cooling capacity in kW or kBtu/h
O_QU1, O_QU2	Double	evaporator capacity in kW or kBtu/h
O_QN1, O_QN2 ³⁴	Double	cooling capacity at standard operating conditions
O_QC1, O_QC2 ³⁵	Double	condenser capacity without heat rejection in kW or kBtu/h
O_QH1, O_QH2 ³⁵	Double	condenser capacity minus heat rejection in kW or kBtu/h
O_P1, O_P2	Double	power consumption in kW
O_E1, O_E2	Double	COP (dimensionless) or EER in Btu/h/W
O_EN1, O_EN2 ³⁴	Double	COP / EER at standard operating conditions
O_VG1, O_VG2	Double	geometric displacement in m ³ /h or ft ³ /h
O_MT1, O_MT2	Single	necessary driving motor in kW
O_M1, O_M2	Double	HP mass flow in kg/h or lb/h
O_ME1, O_ME2	Double	ECO resp. LI mass flow in kg/h or lb/h
O_QS1, O_QS2	Double	subcooler capacity in kW or kBtu/h
O_TE1, O_TE2	Double	saturated ECONOMISER temperature in °C or °F
O_PE1, O_PE2	Double	ECONOMISER pressure in bara or psia
O_TL1, O_TL2	Double	liquid temperature in °C or °F operating mode 1: behind condenser operating mode 2 or 3 (ECO): behind subcooler
O_TH1, O_TH2	Double	hot gas temperature (uncooled) in °C or °F
O_THC1, O_THC2	Double	hot gas temperature (cooled) in °C or °F
O_QA1, O_QA2	Double	additional cooling in kW or kBtu/h
O_VOL1, O_VOL2	Double	oil volume flow in m ³ /h or US gpm
O_TOL1, O_TOL2 ³⁶	Double	oil cooler outlet temperature in °C or °F
O_TJ1, O_TJ2 ³⁷	Double	liquid injection temperature in °C or °F
O_PJ1, O_PJ2 ³⁷	Double	liquid injection pressure in bara or psia

Declaration with Borland Delphi® since version 2009:

```

Type TDesignData = Record
    O_OP1, O_OP2 : LongInt;
    O_Q1, O_Q2 : Double;
    O_QU1, O_QU2 : Double;
    O_QN1, O_QN2 : Double;
    O_QC1, O_QC2 : Double;
    O_QH1, O_QH2 : Double;
    O_P1, O_P2 : Double;
    O_E1, O_E2 : Double;
    O_EN1, O_EN2 : Double;
    O_VG1, O_VG2 : Double;
    O_MT1, O_MT2: Single;
    O_M1, O_M2 : Double;
    O_ME1, O_ME2 : Double;
    O_QS1, O_QS2 : Double;
    O_TE1, O_TE2 : Double;
    O_PE1, O_PE2 : Double;
    O_TL1, O_TL2 : Double;
    O_TH1, O_TH2 : Double;
    O_THC1, O_THC2: Double
    O_QA1, O_QA2 : Double;
    O_VOL1, O_VOL2 : Double;

```

```
O_TOL1, O_TOL2 : Double;
O_TJ1, O_TJ2 : Double;
O_PJ1, O_PJ2 : Double;
End;
```

```
Function CopyDesign(I_RPath: pAnsiChar; I_Flags: LongInt; I_Typ:
pAnsiChar; I_CC: LongInt;
I_Ref: pAnsiChar; I_Q, I_T0, I_TC, I_TS, I_TL: Double; I_TM:
LongInt; I_TLC: Double;
I_TOC: LongInt; I_TOL, I_TN: Double; I_OP: LongInt; I_SP,
I_CR: Single;
O_T1: pAnsiChar; Var O_SzT1: LongInt; O_T2: pAnsiChar; Var
O_SzT2: LongInt;
Var DesignData: TDesignData; Var O_Hint1, O_Hint2: LongInt;
O_Err: PAnsiChar; Var O_SzErr: LongInt): LongInt; StdCall;
External 'OS50.DLL';
```

Buffer variables in calling program:

```
Var
Type1Buf, Type2Buf: AnsiString;
ErrorBuf: AnsiString;
```

Initialization:

```
SetLength(Type1Buf, 30);
SetLength(Type2Buf, 30);
SetLength(ErrorBuf, 20);
O_T1:=@Type1Buf[1]; or: O_T1:=PAnsiChar(Type1Buf);
O_T2:=@Type2Buf[1]; or: O_T2:=PAnsiChar(Type2Buf);
O_Err:=@ErrorBuf[1]; or: O_Err:=PAnsiChar(ErrorBuf);
```

Declaration with Microsoft Visual Basic®:

```
Type TDesignData
O_OP1 As Long
O_OP2 As Long
O_Q1 As Double
O_Q2 As Double
O_QU1 As Double
O_QU2 As Double
O_QN1 As Double
O_QN2 As Double
O_QC1 As Double
O_QC2 As Double
O_QH1 As Double
O_QH2 As Double
O_P1 As Double
O_P2 As Double
O_E1 As Double
```

```

O_E2 As Double
O_EN1 As Double
O_EN2 As Double
O_VG1 As Double
O_VG2 As Double
O_MT1 As Single
O_MT2 As Single
O_M1 As Double
O_M2 As Double
O_ME1 As Double
O_ME2 As Double
O_QS1 As Double
O_QS2 As Double
O_TE1 As Double
O_TE2 As Double
O_PE1 As Double
O_PE2 As Double
O_TL1 As Double
O_TL2 As Double
O_TH1 As Double
O_TH2 As Double
O_THC1 As Double
O_THC2 As Double
O_QA1 As Double
O_QA2 As Double
O_VOL1 As Double
O_VOL2 As Double
O_TOL1 As Double
O_TOL2 As Double
O_TJ1 As Double
O_TJ2 As Double
O_PJ1 As Double
O_PJ2 As Double
End Type

```

```

Declare Function CopyDesign Lib "OS50.DLL" _
    (ByVal I_RPath As String, ByVal I_Flags As Long, ByVal I_Typ
    As String, _
    ByVal I_CC As Long, ByVal I_Ref As String, ByVal I_Q As
    Double, _
    ByVal I_T0 As Double, ByVal I_TC As Double, ByVal I_TS As
    Double, _
    ByVal I_TL As Double, ByVal I_TM As Long, ByVal I_TLC As
    Double, _
    ByVal I_TOC As Long, ByVal I_TOL As Double, ByVal I_TN As
    Double, _
    ByVal I_OP As Long, ByVal I_SP As Single, ByVal I_CR As
    Single, _
    ByVal O_T1 As String, ByRef O_SzT1 As Long, _
    ByVal O_T2 As String, ByRef O_SzT2 As Long, _
    ByRef DesignData As TDesignData, _
    ByRef O_Hint1 As Long, ByRef O_Hint2 As Long, _
    ByVal O_Err As String, ByRef O_SzErr As Long) As Long

```

Buffer variables in calling program:

```
Dim O_T1 As String * 30
Dim O_T2 As String * 30
Dim O_Err As String * 20
```

8.4 Function Thresholds

Minimum and maximum condensing temperature with refrigerant and evaporation temperature given

Exported function of OS50.DLL: Thresholds		
Input parameters		
I_Flags	LongInt	preset data (see chapter 8.9)
I_Typ	pChar	compressor type (see chapter 13)
I_CC	LongInt	0 - <i>reserved for future use</i>
I_Ref	pChar	refrigerant (see chapter 13)
I_T0	Double	evaporation temperature in °C or °F
I_OP	LongInt	operating mode (see chapter 8.11)
I_CR ³³	Single	100 – <i>reserved for future use (capacity control step in %)</i>
I_Range	LongInt	0: application limits of compressor 1: calculation limits without range „data on request“
Output parameters		
O_OP	LongInt	operating mode (see chapter 8.11)
O_TCmin	Double	minimum condensing temperature in °C or °F
O_TCmax	Double	maximum condensing temperature in °C or °F
O_Err	pChar	supplement to error message
Thresholds	LongInt	error message (see chapter 1.3)

Temperatures O_TCmin and O_TCmax are dew point temperatures.

Declaration with Borland Delphi® sinc version 2009:

```
Function Thresholds(I_Flags: LongInt; I_Typ: pAnsiChar; I_CC: LongInt; I_Ref: pAnsiChar;
I_T0: Double; I_OP: LongInt; I_CR: Single; I_Range: LongInt;
Var O_OP: LongInt;
Var O_TCmin, O_TCmax: Double;
Var O_Err: pAnsiChar): LongInt; StdCall; External 'OS50.DLL';
```

8.5 Function CopyThresholds

Minimum and maximum condensing temperature with refrigerant and evaporation temperature given

Exported function of OS50.DLL: CopyThresholds		
Input parameters		
I_Flags	LongInt	preset data (see chapter 8.9)
I_Typ	pChar	compressor type (see chapter 13)
I_CC	LongInt	0 - <i>reserved for future use</i>
I_Ref	pChar	refrigerant (see chapter 13)
I_T0	Double	evaporation temperature in °C or °F
I_OP	LongInt	operating mode (see chapter 8.11)
I_CR ³³	Single	100 – <i>reserved for future use (capacity control step in %)</i>
I_Range	LongInt	0: application limits of compressor 1: calculation limits without range „data on request“
Output parameters		
O_OP	LongInt	operating mode (see chapter 8.11)
O_TCmin	Double	minimum condensing temperature in °C or °F
O_TCmax	Double	maximum condensing temperature in °C or °F
O_Err	pChar	supplement to error message, filled with spaces on the right
O_SzErr	LongInt	length of O_Err without spaces
CopyThresholds	LongInt	error message (see chapter 1.3)

Temperatures O_TCmin and O_TCmax are dew point temperatures.

Declaration with Borland Delphi® since version 2009:

```
Function CopyThresholds(I_Flags: LongInt; I_Typ: pAnsiChar; I_CC:
    LongInt; I_Ref: pAnsiChar;
    I_T0: Double; I_OP: LongInt; I_CR: Single; I_Range: LongInt;
    Var O_OP: LongInt; Var O_TCmin, O_TCmax: Double;
    O_Err: pAnsiChar; Var O_SzErr: LongInt): LongInt; StdCall;
External 'OS50.DLL';
```

Buffer variable in calling program:

```
Var
    ErrorBuf: AnsiString;
```

Initialization:

```
SetLength(ErrorBuf, 20);
O_Err:=@ErrorBuf[1]; or: O_Err:=pAnsiChar(ErrorBuf);
```

Declaration with Microsoft Visual Basic®:

```
Declare Function CopyThresholds Lib "OS50.DLL" _
    (ByVal I_Flags As Long, ByVal I_Typ As String, ByVal I_CC As
    Long, _
    ByVal I_Ref As String, ByVal I_T0 As Double, ByVal I_OP As
    Long, _
    ByVal I_CR As Single, ByVal I_Range As Long, _
    ByRef O_OP As Long, ByRef O_TCmin As Double, ByRef O_TCmax
    As Double, _
    ByVal O_Err As String, ByRef O_SzErr As Long) As Long
```

Buffer variable in calling program:

```
Dim O_Err As String * 20
```

8.6 Function TechData

Technical data of compressors

Exported function of OS50.DLL: TechData		
Input parameters		
I_Flags	LongInt	preset data (see chapter 8.9)
I_Typ	pChar	compressor type (see chapter 13)
I_CC	LongInt	0 - <i>reserved for future use</i>
I_SP	Single	Compressor speed in min-1

Exported function of OS50.DLL: TechData		
Output parameters		
O_PC	Single	maximum power consumption in kW
O_SMT	Single	acoustic power level at middle temperature conditions in dB
O_SLT	Single	acoustic power level at low temperature conditions in dB
TechData	LongInt	error message (see chapter 1.3)

Declaration with Borland Delphi® since version 2009:

```
Function TechData(I_Flags: LongInt; I_Typ: pAnsiChar; I_CC:
    LongInt; I_SP: Single;
    Var O_PC, O_SMT, O_SLT: Single):
    LongInt; StdCall; External 'OS50.DLL';
```

Declaration with Microsoft Visual Basic®:

```
Declare Function TechData Lib "OS50.DLL" _
    (ByVal I_Flags As Long, ByVal I_Typ As String, ByVal I_CC As
    Long, _
    ByVal I_SP As Single, _
    ByRef O_PC As Single, ByRef O_SMT As Single, _
    ByRef O_SLT As Single) As Long
```

8.7 Function LiquidTemps

Liquid temperature with/without subcooler

Exported function of OS50.DLL: LiquidTemps		
Input parameters		
I_RPath	pChar	path of refrigerant fluid files *.REF ('ASEREP')
I_Flags	LongInt	preset data (see chapter 8.9)
I_Typ	pChar	compressor type (see chapter 13)
I_CC	LongInt	0 - reserved for future use
I_Ref	pChar	refrigerant (see chapter 13)
I_T0	Double	evaporation temperature in °C or °F
I_TC	Double	condensing temperature in °C or °F
I_TS	Double	suction gas temperature in °C/ °F or superheat i K/ °F dependent on I_Flags
I_SP	Single	Compressor speed in min ⁻¹ (only 2900 or 3500 min ⁻¹ allowed)
Output parameters		
O_TChub	Double	condensing temperature: boiling point in °C or °F = maximum liquid temperature with normal operation
O_TUmin	Double	minimum liquid temperature with subcooler in °C or °F
O_TUopt ³⁸	Double	recommended liquid temperature with subcooler in °C or °F
O_TUmax	Double	maximum liquid temperature with subcooler in °C or °F
O_TEmin	Double	minimum saturated ECONOMISER temperature in °C or °F
LiquidTemps	LongInt	error message (see chapter 1.3)

Declaration with Borland Delphi® since version 2009:

```
Function LiquidTemps(I_RPath: pAnsiChar; I_Flags: LongInt; I_Typ:
    pAnsiChar; I_CC: LongInt;
    I_Ref: pAnsiChar; I_T0, I_TC, I_TS: Double; I_SP: Single;
```

```
Var O_TCbub, O_TUmin, O_TUopt, O_TUmax, O_TEmin: Double):
LongInt; StdCall; External 'OS50.DLL';
```

Declaration with Microsoft Visual Basic®:

```
Declare Function LiquidTemps Lib "OS50.DLL" _
    (ByVal I_RPath As String, ByVal I_Flags As Long, ByVal I_Typ
    As String, _
    ByVal I_CC As Long, ByVal I_Ref As String, ByVal I_T0 As
    Double, _
    ByVal I_TC As Double, ByVal I_TS As Double, ByVal I_SP As
    Single, _
    ByRef O_TCbub As Double, ByRef O_TUmin As Double, _
    ByRef O_TUopt As Double, ByRef O_TUmax As Double, _
    ByRef O_TEmin As Double) As Long
```

8.8 Driving motor sizes for coupling drive

Compressor types	Motor sizes (coupling housing available)
OS.5341 ... OS.5361	50 Hz: 11/ 15/ 18.5/ 22/ 30/ 37 kW 60 Hz: 12.6/ 17.3/ 21.3/ 24.5/ 33.5/ 41.5 kW
OS.7441 ... OS.7471	50 Hz: 18.5/ 22/ 30/ 37/ 45/ 55/ 75/ 90 kW 60 Hz: 21.3/ 24.5/ 33.5/ 41.5/ 51/ 62/ 84/ 101 kW
OS.8551 ... OS.8571	50 Hz: 45/ 55/ 75/ 90/ 110/ 132/ 160/ 200 kW 60 Hz: 51/ 62/ 84/ 101/ 123/ 148/ 180/ 224 kW
OSKA9593 / OSKA95103	50Hz: 110/ 132/ 160/ 200/ 250/ 315/ 350/ 400kW 60Hz: 123/ 148/ 180/ 224/ 353/ 398/ 448/ 504kW

8.9 Allowed values of I_Flags

Value	Constant	Meaning	
1	CalcWithIPUnits	0	SI units
		1	IP units
2	CalcWithCapacity	0	compressor type given
		2	capacity given
4	CalcWithSuperheat	0	input suction gas temperature
		4	input suction superheat
8	CalcWithUsefulSuperheat	0	ignore useful superheat
		8	input useful superheat
16	CalcWithSubcooling	0	input liquid temperature
		16	input liquid subcooling
32	CalcWithSubcooler	0	
		32	reserved
64	CalcWithSeaWater	0	
		64	reserved
128	CalcWithMiddleTemp	0	based on dew point temperatures
		128	based on mean temperatures
256	CalcWithFan	0	
		256	reserved
512	CalcWith Tandem	0	
		512	reserved
16384	CalcWithExpansion	0	
		16384	reserved

Value	Constant	Meaning
32768	CalcWithLPDrop	0 32768 reserved
65536	CalcWithHPDrop	0 65536 reserved
131072	CalcWithEcoStar	0 131072 reserved
262144	CalcWithHeatPump	0 262144 reserved

8.10 Allowed values of I_SP

frequency [Hz]	speed [min ⁻¹]
50	2900
60	3500

8.11 Allowed values of I_OP

0	automatic selection of operating mode – not realized at this time –
1	standard operating mode
2	Economiser operation, liquid temperature in subcooler specified by user
3	Economiser operation, liquid temperature in subcooler specified automatic by program

8.12 Allowed values of I_CR

Compressors	CR capacity control steps (%)
OS.5341 ... OS.5361	100, 75
OS.7441 ... OS.7471	100, 75, 50
OS.8551 ... OS.8591	100, 75, 50

³³ only interpreted if type given

³⁴ operating mode 1 (standard) and external oil cooling: without liquid subcooling

³⁵ with liquid subcooling

³⁶ external oil cooling (I_TOC ≠ 1)

³⁷ liquid injection LI (I_TOC = 1)

³⁸ O_TUopt = t_{eco} + 10K resp. O_TUopt = t_{eco} + 20°F

9 Hermetic Scroll Compressors ("ESC") → ESC51.DLL

Attention! For calculation BNP50.DLL and ASEREP32.DLL have to be in the same directory as ESC51.DLL.

Calling convention "stdCall" in Delphi-Pascal corresponds to "__stdcall" in C++

9.1 Function Design

Performance data for a given compressor type respectively
selection of maximum two compressor types with capacity given

Exported function of ESC51.DLL: Design		
Input parameters		
I_RPath	pChar	path of refrigerant fluid files *.REF ('ASEREP')
I_NPath	pChar	path of name plate data files BNPE*.DAT
I_Flags	LongInt	preset data (see chapter 9.6)
I_Serie ³⁹	LongInt	compressor series: 1=ESH, 2=ORBIT 6/8, 4=ORBIT 8 Boreal, 6=ORBIT PRO, 8=ELH/ELA, 8192=ORBIT+, 4194304=ORBIT FIT
I_Typ	pChar	compressor type (see chapter 13)
I_CC	LongInt	company code
I_Ref	pChar	refrigerant (see chapter 13)
I_Q	Double	cooling capacity in kW or kBTu/h
I_T0	Double	evaporation temperature in °C or °F
I_TC	Double	condensing temperature in °C or °F
I_TS	Double	suction gas temperature in °C / °F or superheat in K / °F dependent on I_Flags
I_TL	Double	liquid temperature in °C / °F or sub-cooling in K / °F dependent on I_Flags
I_TM	LongInt	only operating mode 2 (ECO): kind of I_TLC (subcooler temperature)
I_TLC	Double	only operating mode 2 (ECO): I_TM = 0: liquid temperature in °C or °F I_TM = 1: liquid subcooling in K or °F I_TM = 2: temp. diff. between subcooler and ECO temperature in K or °F
I_TN	Double	useful superheat in K or °F
I_Net	LongInt	three-digit motor index (see chapter 13)
I_DS ⁴⁰	LongInt	motor winding type: 1 = delta, 2 = star, 3 = part winding (see chapter 13)
I_OV ⁴⁰	LongInt	operating voltage (see chapter 13)
I_FI	LongInt	frequency inverter: 0 = without FI, 1 = internal FI, 2 = external FI
I_FCF	Double	frequency in Hz
I_FCV	LongInt	supply voltage in V
I_FCOF	LongInt	supply frequency in Hz
I_FCMV	LongInt	0 – reserved for future use(max. output voltage in V)
I_OP	LongInt	operating mode (see chapter 9.7)
I_CR ⁴⁰	Single	capacity control step in %
Output parameters		
O_T1, O_T2	pChar	two selected compressor types
O_FCF1, O_FCF2	LongInt	inverter frequency in Hz
O_FCFmin1, O_FCFmin2	LongInt	inverter frequency of minimum capacity in Hz

Exported function of ESC51.DLL: Design		
O_FCFmax1, O_FCFmax2	LongInt	inverter frequency of maximum capacity in Hz
O_Q1, O_Q2	Double	cooling capacity in kW or kBtu/h
O_Qmin1, O_Qmin2	Double	minimum cooling capacity / heating capacity in kW or kBtu/h
O_Qmax1, O_Qmax2	Double	maximum cooling capacity / heating capacity in kW or kBtu/h
O_QU1, O_QU2	Double	evaporator capacity in kW or kBtu/h
O_QN1, O_QN2	Double	cooling capacity at ISO standard operating conditions
O_QC1, O_QC2 ⁴¹	Double	condenser capacity without heat rejection in kW or kBtu/h
O_QH1, O_QH2 ⁴¹	Double	condenser capacity minus heat rejection in kW or kBtu/h
O_P1, O_P2	Double	power consumption in kW
O_I1, O_I2	Double	current in A
O_COS1, O_COS2	Double	power factor cos PHI
O_E1, O_E2	Double	COP (dimensionless) or EER in Btu/h/W
O_EN1, O_EN2	Double	COP / EER at ISO standard operating conditions
O_VG1, O_VG2	Double	geometric displacement in m ³ /h or ft ³ /h
O_M1, O_M2	Double	mass flow in kg/h or lb/h
O_ME1, O_ME2	Double	ECO mass flow in kg/h or lb/h
O_QS1, O_QS2	Double	subcooler capacity in kW or kBtu/h
O_TE1, O_TE2	Double	saturated ECONOMISER temperature in °C or °F
O_PE1, O_PE2	Double	ECONOMISER pressure in bara or psia
O_TL1, O_TL2	Double	liquid temperature in °C or °F
O_TH1, O_TH2	Double	<i>hot gas temperature (uncooled)</i>
O_Hint1, O_Hint2	LongInt	hint(s) (see chapter 1.4 and 1.5)
O_Err	pChar	supplement to error message
Design	LongInt	error message (see chapter 1.3)

Declaration with Borland Delphi® since version 2009:

```

Function Design(I_RPath, I_NPath: pAnsiChar; I_Flags, I_Serie:
    LongInt; I_Typ: pAnsiChar;
    I_CC: LongInt; I_Ref: pAnsiChar; I_Q, I_T0, I_TC, I_TS,
    I_TL, I_TN: Double;
    I_Net, I_DS, I_OV, I_FI, I_FCF: Double; I_FCV, I_FCOF,
    I_FCMV: LongInt;
    I_CR: Single
    Var O_T1, O_T2: pAnsiChar;
    Var O_FCF1, O_FCF2, O_FCFmin1, O_FCFmin2, O_FCFmax1,
    O_FCFmax2: LongInt;
    Var O_Q1, O_Q2, O_Qmin1, O_Qmin2, O_Qmax1, O_Qmax2, O_QU1,
    O_QU2, O_QN1, O_QN2, O_QC1, O_QC2,
    O_QH1, O_QH2, O_P1, O_P2, O_I1, O_I2, O_COS1, O_COS2, O_E1,
    O_E2,
    O_EN1, O_EN2, O_VG1, O_VG2, O_M1, O_M2, O_TH1, O_TH2:
    Double;
    Var O_Hint1, O_Hint2: LongInt; Var O_Err: pAnsiChar):
    LongInt; StdCall; External 'ESC51.DLL';

```

9.2 Function CopyDesign

Performance data for a given compressor type respectively
selection of maximum two compressor types with capacity given

Exported function of ESC51.DLL: CopyDesign		
Input parameters		
I_RPath	pChar	path of refrigerant fluid files *.REF ('ASEREP')
I_NPath	pChar	path of name plate data files BNPE*.DAT
I_Flags	LongInt	preset data (see chapter 9.6)
I_Serie ³⁹	LongInt	compressor series: 1=ESH, 2=ORBIT 6/8, 4=ORBIT 8 Boreal, 6=ORBIT PRO, 8=ELH/ELA, 8192=ORBIT+, 4194304=ORBIT FIT
I_Typ	pChar	compressor type (see chapter 13)
I_CC	LongInt	company code
I_Ref	pChar	refrigerant (see chapter 13)
I_Q	Double	cooling capacity in kW or kBtu/h
I_T0	Double	evaporation temperature in °C or °F
I_TC	Double	condensing temperature in °C or °F
I_TS	Double	suction gas temperature in °C / °F or superheat in K / °F dependent on I_Flags
I_TL	Double	liquid temperature in °C / °F or sub-cooling in K / °F dependent on I_Flags
I_TM	LongInt	only operating mode 2 (ECO): kind of I_TLC (subcooler temperature)
I_TLC	Double	only operating mode 2 (ECO): I_TM = 0: liquid temperature in °C or °F I_TM = 1: liquid subcooling in K or °F I_TM = 2: temp. diff. between subcooler and ECO temperature in K or °F
I_TN	Double	useful superheat in K or °F
I_Net	LongInt	power supply (see chapter 13)
I_DS ⁴⁰	LongInt	motor winding type: 1 = delta, 2 = star, 3 = part winding (see chapter 13)
I_OV ⁴⁰	LongInt	operating voltage (see chapter 13)
I_FI	LongInt	frequency inverter: 0 = without FI, 1 = internal FI, 2 = external FI
I_FCF	Double	frequency in Hz
I_FCV	LongInt	supply voltage in V
I_FCOF	LongInt	supply frequency in Hz
I_FCMV	LongInt	0 – reserved for future use(max. output voltage in V)
I_OP	LongInt	operating mode (see chapter 9.7)
I_CR ⁴⁰	Single	capacity control step in %
Output parameters		
O_T1	pChar	first selected compressor type, filled with spaces on the right
O_SzT1	LongInt	length of O_T1 without spaces
O_T2	pChar	second selected compressor type, filled with spaces on the right
O_SzT2	LongInt	length of O_T2 without spaces
DesignData	TDesignData	see below
O_Hint1, O_Hint2	LongInt	hint(s) (see chapter 1.4 and 1.5)
O_Err	pChar	supplement to error message, filled with spaces on the right
O_SzErr	LongInt	length of O_Err without spaces
CopyDesign	LongInt	error message (see chapter 1.3)
Data fields of array DesignData:		
O_FCF1, O_FCF2	LongInt	inverter frequency in Hz
O_FCFmin1, O_FCFmin2	LongInt	inverter frequency of minimum capacity in Hz
O_FCFmax1, O_FCFmax2	LongInt	inverter frequency of maximum capacity in Hz
O_Q1, O_Q2	Double	cooling capacity / heating capacity in kW or kBtu/h
O_Qmin1, O_Qmin2	Double	minimum cooling capacity / heating capacity in kW or kBtu/h
O_Qmax1, O_Qmax2	Double	maximum cooling capacity / heating capacity in kW or kBtu/h
O_QU1, O_QU2	Double	evaporator capacity in kW or kBtu/h
O_QN1, O_QN2	Double	cooling capacity at ISO standard operating conditions
O_QC1, O_QC2 ⁴¹	Double	condenser capacity without heat rejection in kW or kBtu/h
O_QH1, O_QH2 ⁴¹	Double	condenser capacity minus heat rejection in kW or kBtu/h

Exported function of ESC51.DLL: CopyDesign		
O_P1, O_P2	Double	power consumption in kW
O_I1, O_I2	Double	current in A
O_COS1, O_COS2	Double	power factor cos PHI
O_E1, O_E2	Double	COP (dimensionless) or EER in Btu/h/W
O_EN1, O_EN2	Double	COP / EER at ISO standard operating conditions
O_VG1, O_VG2	Double	geometric displacement (LP) in m³/h or ft³/h
O_M1, O_M2	Double	mass flow in kg/h or lb/h
O_ME1, O_ME2	Double	ECO mass flow in kg/h or lb/h
O_QS1, O_QS2	Double	subcooler capacity in kW or kBtu/h
O_TE1, O_TE2	Double	saturated ECONOMISER temperature in °C or °F
O_PE1, O_PE2	Double	ECONOMISER pressure in bara or psia
O_TL1, O_TL2	Double	liquid temperature in °C or °F
O_TH1, O_TH2	Double	<i>hot gas temperature (uncooled)</i>

Declaration with Borland Delphi® since version 2009:

```

Type TDesignData = Record
    O_FCF1, O_FCF2: Double;
    O_FCFmin1, O_FCFmin2: LongInt;
    O_FCFmax1, O_FCFmax2: LongInt;
    O_Q1, O_Q2: Double;
    O_Qmin1, O_Qmin2: Double;
    O_Qmax1, O_Qmax2: Double;
    O_QU1, O_QU2: Double;
    O_QN1, O_QN2: Double;
    O_QC1, O_QC2: Double;
    O_QH1, O_QH2: Double;
    O_P1, O_P2: Double;
    O_I1, O_I2: Double;
    O_COS1, O_COS2: Double;
    O_E1, O_E2: Double;
    O_EN1, O_EN2: Double;
    O_VG1, O_VG2: Double;
    O_M1, O_M2: Double;
    O_TH1, O_TH2: Double;
End;

Function CopyDesign(I_RPath, I_NPath: pAnsiChar; I_Flags, I_Serie:
    LongInt; I_Typ: pAnsiChar;
    I_CC: LongInt; I_Ref: pAnsiChar; I_Q, I_T0, I_TC, I_TS,
    I_TL, I_TN: Double;
    I_Net, I_DS, I_OV, I_FI, I_FCF: Double; I_FCV, I_FCOF,
    I_FCMV: LongInt;
    I_CR: Single;
    O_T1: pAnsiChar; Var O_SzT1: LongInt; O_T2: pAnsiChar; Var
    O_SzT2: LongInt;
    Var DesignData: TDesignData, Var O_Hint1, O_Hint2: LongInt;
    O_Err: pAnsiChar; Var O_SzErr: LongInt): LongInt; StdCall;
External 'ESC51.DLL';

```

Buffer variables in calling program:

```
Var
Type1Buf, Type2Buf: AnsiString;
ErrorBuf: AnsiString;
```

Initialization:

```
SetLength(Type1Buf, 30);
SetLength(Type2Buf, 30)
SetLength(ErrorBuf, 20);
O_T1:=@Type1Buf[1]; or: O_T1:=pAnsiChar(Type1Buf);
O_T2:=@Type2Buf[1]; or: O_T2:=pAnsiChar(Type2Buf);
O_Err:=@ErrorBuf[1]; or: O_Err:=pAnsiChar(ErrorBuf);
```

Declaration with Microsoft Visual Basic®:

```
Type TDesignData
    O_FCF1 As Long
    O_FCF2 As Long
    O_FCFmin1 As Long
    O_FCFmin2 As Long
    O_FCFmax1 As Long
    O_FCFmax2 As Long
    O_Q1 As Double
    O_Q2 As Double
    O_Qmin1 As Double
    O_Qmin2 As Double
    O_Qmax1 As Double
    O_Qmax2 As Double
    O_QU1 As Double
    O_QU2 As Double
    O_QN1 As Double
    O_QN2 As Double
    O_QC1 As Double
    O_QC2 As Double
    O_QH1 As Double
    O_QH2 As Double
    O_P1 As Double
    O_P2 As Double
    O_I1 As Double
    O_I2 As Double
    O_COS1 As Double
    O_COS2 As Double
    O_E1 As Double
    O_E2 As Double
    O_EN1 As Double
    O_EN2 As Double
    O_VG1 As Double
    O_VG2 As Double
    O_M1 As Double
    O_M2 As Double
    O_ME1 As Double
    O_ME2 As Double
    O_QS1 As Double
```

```
O_QS2 As Double
O_TE1 As Double
O_TE2 As Double
O_PE1 As Double
O_PE2 As Double
O_TL1 As Double
O_TL2 As Double
O_TH1 As Double
O_TH2 As Double
End Type
```

```
Declare Function CopyDesign Lib "ESC51.DLL" _
    (ByVal I_RPath As String, ByVal I_NPath As String, _
    ByVal I_Flags As Long, _
    ByVal I_Serie As Long, ByVal I_Typ As String, _
    ByVal I_CC As Long, _
    ByVal I_Ref As String, ByVal I_Q As Double, _
    ByVal I_T0 As Double, _
    ByVal I_TC As Double, ByVal I_TS As Double, _
    ByVal I_TL As Double, _
    ByVal I_TM As Long, ByVal I_TLC As Double, _
    ByVal I_TN As Double, _
    ByVal I_Net As Long, ByVal I_DS As Long, _
    ByVal I_OV As Long, ByVal I_FI As Long, _
    ByVal I_FCF As Double, ByVal I_FCV As Long, _
    ByVal I_FCOF As Long, _
    ByVal I_FCMV As Long, ByVal I_OP As Long, _
    ByVal I_CR As Single, _
    ByVal O_T1 As String, ByRef O_SzT1 As Long, _
    ByVal O_T2 As String, _
    ByRef O_SzT2 As Long, ByRef DesignData As TDesignData, _
    ByRef O_Hint1 As Long, ByRef O_Hint2 As Long, _
    ByVal O_Err As String, _
    ByRef O_SzErr As Long) As Long
```

Buffer variables in calling program:

```
Dim O_T1 As String * 30
Dim O_T2 As String * 30
Dim O_Err As String * 20
```

9.3 Function Thresholds

Minimum and maximum condensing temperature with refrigerant and evaporation temperature given

Exported function of ESC51.DLL: Thresholds		
Input parameters		
I_Flags	LongInt	preset data (see chapter 9.6)
I_Serie	LongInt	compressor series: 1=ESH, 2=ORBIT 6/8, 4=ORBIT 8 Boreal, 6=ORBIT PRO, 8=ELH/ELA, 8192=ORBIT+, 4194304=ORBIT FIT
I_Typ	pChar	compressor type (see chapter 13)
I_CC	LongInt	company code
I_Ref	pChar	refrigerant (see chapter 13)

Exported function of ESC51.DLL: Thresholds		
I_T0	Double	evaporation temperature in °C or °F
I_Range	LongInt	0: application limits of compressor 1: calculation limits without range „data on request“
I_OP	LongInt	operating mode (see chapter 9.7)
Output parameters		
O_TCmin	Double	minimum condensing temperature in °C or °F
O_TCmax	Double	maximum condensing temperature in °C or °F with suction superheat limited to 10 K / 18 °F
O_TCmaxred	Double	maximum condensing temperature in °C or °F with suction gas temperature limited to 20 °C / 68 °F
O_Err	pChar	supplement to error message
Thresholds	LongInt	error message (see chapter 1.3)

Declaration with Borland Delphi® since version 2009:

```
Function Thresholds(I_Flags, I_Serie: LongInt; I_Typ: pAnsiChar;
  I_CC: LongInt; I_Ref: pAnsiChar;
  I_T0: Double; I_Range: LongInt; I_OP: LongInt;
  Var O_TCmin, O_TCmax, O_TCmaxred: Double;
  Var O_Err: pAnsiChar): LongInt; StdCall; External
  'ESC51.DLL';
```

9.4 Function CopyThresholds

Minimum and maximum condensing temperature with refrigerant and evaporation temperature given

Exported function of ESC51.DLL: CopyThresholds		
Input parameters		
I_Flags	LongInt	preset data (see chapter 9.6)
I_Serie	LongInt	compressor series: 1=ESH, 2=ORBIT 6/8, 4=ORBIT 8 Boreal, 6=ORBIT PRO, 8=ELH/ELA, 8192=ORBIT+, 4194304=ORBIT FIT
I_Typ	pChar	compressor type (see chapter 13)
I_CC	LongInt	company code
I_Ref	pChar	refrigerant (see chapter 13)
I_T0	Double	evaporation temperature in °C or °F
I_Range	LongInt	0: application limits of compressor 1: calculation limits without range „data on request“
I_OP	LongInt	operating mode (see chapter 9.7)
Output parameters		
O_TCmin	Double	minimum condensing temperature in °C or °F
O_TCmax	Double	maximum condensing temperature in °C or °F with suction superheat limited to 10 K / 18 °F
O_TCmaxred	Double	maximum condensing temperature in °C or °F with suction gas temperature limited to 20 °C / 68 °F
O_Err	pChar	supplement to error message, filled with spaces on the right
O_SzErr	LongInt	length of O_Err without spaces
CopyThresholds	LongInt	error message (see chapter 1.3)

Declaration with Borland Delphi® since version 2009:

```
Function CopyThresholds(I_Flags, I_Serie: LongInt; I_Typ:
  PAnsiChar; I_CC: LongInt; I_Ref: pAnsiChar;
  I_T0: Double; I_Range: LongInt; I_OP: LongInt;
  Var O_TCmin, O_TCmax, O_TCmaxred: Double;
  O_Err: pAnsiChar; Var O_SzErr: LongInt): LongInt; StdCall;
  External 'ESC51.DLL';
```

Buffer variable in calling program:

```
Var
  ErrorBuf: AnsiString;
```

Initialization:

```
SetLength(ErrorBuf, 20);
O_Err:=@ErrorBuf[1]; or: O_Err:=pChar(ErrorBuf);
```

Declaration with Microsoft Visual Basic®:

```
Declare Function CopyThresholds Lib "ESC51.DLL" _
  (ByVal I_Flags As Long, ByVal I_Serie As Long, ByVal I_Typ
  As String, _
  ByVal I_CC As Long, ByVal I_Ref As String, ByVal I_T0 As
  Double, _
  ByVal I_Range As Long, ByVal I_OP As Long, _
  ByRef O_TCmin As Double, ByRef O_TCmax As Double, _
  ByRef O_TCmaxred As Double, _
  ByVal O_Err As String, ByRef O_SzErr As Long) As Long
```

Buffer variable in calling program:

```
Dim O_Err As String * 20
```

9.5 Function TechData

Technical data of compressors

Exported function of ESC51.DLL: TechData		
Input parameters		
I_Serie	LongInt	(not used)
I_Typ	pChar	compressor type (see chapter 13)
I_CC	LongInt	company code
I_Net	LongInt	three-digit motor index (see chapter 13) (defines motor speed)
Output parameters		
O_PC	Single	maximum power consumption in kW
O_SHT	Single	acoustic power level at high temperature conditions in dB
O_SMT	Single	acoustic power level at middle temperature conditions in dB
O_SLT	Single	acoustic power level at low temperature conditions in dB
TechData	LongInt	error message (see chapter 1.3)

Declaration with Borland Delphi® since version 2009:

```
Function TechData(I_Serie: LongInt; I_Typ: pAnsiChar; I_CC, I_Net:
  LongInt;
```

```
Var O_PC, O_SHT, O_SMT, O_SLT: Single):  
LongInt; StdCall; External 'ESC51.DLL';
```

Declaration with Microsoft Visual Basic®:

```
Declare Function TechData Lib "ESC51.DLL" _  
    (ByVal I_Serie As Long, ByVal I_Typ As String, ByVal I_CC As  
    Long, _  
    ByVal I_Net As Long, _  
    ByRef O_PC As Single, ByRef O_SHT As Single, _  
    ByRef O_SMT As Single, ByRef O_SLT As Single) As Long
```

9.6 Allowed values of I_Flags

Value	Constant	Meaning	
1	CalcWithIPUnits	0	SI units
		1	IP units
2	CalcWithCapacity	0	compressor type given
		2	capacity given
4	CalcWithSuperheat	0	input suction gas temperature
		4	input suction superheat
8	CalcWithUsefulSuperheat	0	ignore useful superheat
		8	input useful superheat
16	CalcWithSubcooling	0	input liquid temperature
		16	input liquid subcooling
32	CalcWithSubcooler	0	
		32	reserved
64	CalcWithSeaWater	0	
		64	reserved
128	CalcWithMiddleTemp	0	based on dew point temperatures
		128	based on mean temperatures
256	CalcWithFan	0	
		256	reserved
512	CalcWithTandem	0	only single compressors
		512	only tandem compressors (only for ESH series with capacity given)
16384	CalcWithExpansion	0	
		16384	reserved
32768	CalcWithLPDrop	0	
		32768	reserved
65536	CalcWithHPDrop	0	
		65536	reserved
131072	CalcWithEcoStar	0	
		131072	reserved
262144	CalcWithHeatPump	0	
		262144	reserved

9.7 Allowed values of I_OP

0	automatic selection of operating mode - not realized so far
1	standard operating mode
2	ECONOMISER operation, liquid temperature in subcooler specified by user
3	ECONOMISER operation, liquid temperature in subcooler specified automatic by program

9.8 Allowed values of I_CR

Compressors	CR capacity control steps (%)
single compressors	100
tandem compressors ESH77-50, ESH77-60, ESH77-72, ESH77-86	100, 50
tandem compressor ESH77-61	100, 60, 40

9.9 Allowed values of I_CC

0	standard country code
86	China & Hongkong

³⁹ only interpreted if capacity given

⁴⁰ only interpreted if type given

⁴¹ with liquid subcooling

10 Air-cooled condensing units ("LH") → LLH52.DLL

Attention! For calculation BNP50.DLL, HK52A.DLL, HHK52B.DLL, ASEREP32.DLL and BIREF32.DLL have to be in the same directory as LLH52.DLL.

Calling convention "stdCall" in Delphi-Pascal corresponds to "__stdcall" in C++

10.1 Function Design

Performance data for a given condensing unit respectively
selection of maximum four condensing units with capacity given

Exported function of LLH52.DLL: Design		
Input parameters		
I_RPath	pChar	path of refrigerant fluid files *.REF ('ASEREP')
I_NPath	pChar	path of name plate data files BNPA*.DAT
I_Flags	LongInt	preset data (see chapter 10.3)
I_Serie	LongInt	series (see chapter 10.4)
I_Typ	pChar	condenser unit type (see chapter 13)
I_CC	LongInt	0 – <i>reserved for future use</i>
I_Ref	pChar	refrigerant (see chapter 13)
I_Q	Double	cooling capacity in kW or kBtu/h
I_T0	Double	evaporation temperature in °C or °F
I_Tamb	Double	ambient temperature in °C or °F
I_TS	Double	suction gas temperature in °C / °F or superheat in K / °F dependent on I_Flags
I_TN	Double	useful superheat in K or °F
I_Net	LongInt	three-digit motor index (see chapter 13)
I_DS ⁴²	LongInt	motor winding type: 1 = delta, 2 = star, 3 = part winding (see chapter 13)
I_OV ⁴²	LongInt	operating voltage (see chapter 13)
I_FI	LongInt	frequency inverter: 0 = without, 1 = internal, 2 = external FI
I_FCF ^{42 43}	Double	selected FI frequency in Hz
I_FCV ⁴³	LongInt	supply voltage in V
I_FCOF ⁴³	LongInt	supply frequency in Hz
I_FCMV ⁴³	LongInt	0 – <i>reserved for future use (max. output voltage in V)</i>
I_Op	LongInt	operating mode (see chapter 10.6)
O_OpF ⁴³	LongInt	Ecostar mode: 0 = economy, 1 = low sound
I_CR ⁴⁴	Single	100 – <i>reserved for future use (capacity control step in %)</i>
Output parameters		
O_NUnit	LongInt	number of selected units (0 ... 4)
O_TTyp	TTypAry	selected condensing units 1 ... O_NUnit
O_TData	TDataAry	data of selected condenser units
O_Hint1, O_Hint2, O_Hint3	LongInt	hint(s) (see chapter 1.4 and 1.5 and 1.6)
O_Err	pChar	supplement to error message
Design	LongInt	error message (see chapter 1.3)
Data fields of array TData		
O_UnitNo	LongInt	serial number of condensing unit
O_Q	Double	cooling capacity in kW or kBtu/h
O_Qmin ⁴³	Double	minimum cooling capacity in kW or kBtu/h
O_Qmax ⁴³	Double	maximum cooling capacity in kW or kBtu/h
O_QU	Double	evaporator capacity in kW or kBtu/h

Exported function of LLH52.DLL: Design		
O_QC	Double	Condenser capacity in kW or kBtu/h
O_TC	Double	condensing temperature in °C or °F
O_DT	Double	condensing temperature - ambient temperature temperature difference in K or °F
O_DTU	Double	liquid subcooling in K or °F
O_Op	LongInt	operating mode (see chapter 10.6)
O_FCF ⁴³	LongInt	inverter frequency in Hz
O_FCFmin ⁴³	LongInt	inverter frequency for minimum cooling capacity in Hz
O_FCFmax ⁴³	LongInt	inverter frequency for maximum cooling capacity in Hz
O_P	Double	power consumption in kW
O_I	Double	current in A
O_M	Double	refrigerant mass flow in kg/h or lb/h
O_PF ⁴³	Double	fan power consumption in kW
O_MC	pChar	motor code for compressor designation
O_VR	pChar	voltage range
O_Net	LongInt	three-digit motor index (see chapter 13)
O_DS	LongInt	motor winding type: 1 = delta, 2 = star, 3 = part winding
O_OV	LongInt	operating voltage in V

Declaration with Borland Delphi® since version 2009:

```
Function Design(I_RPath, I_NPath: pAnsiChar; I_Flags, I_Serie:
    LongInt; I_Typ: pAnsiChar;
    I_CC: LongInt; I_Ref: pAnsiChar; I_Q, I_T0, I_Tamb, I_TS,
    I_TN: Double;
    I_Net, I_DS, I_OV, I_FI: LongInt; I_FCF: Double;
    I_FCV, I_FCOF, I_FCMV, I_Op, I_OpF: LongInt; I_CR: Single;
    Var O_NUnit: LongInt; Var O_TTyp: TTypArray; Var O_TData:
    TDataArray;
    Var O_Hint1, O_Hint2, O_Hint3: LongInt; Var O_Err: pChar):
    LongInt; StdCall; External 'LLH52.DLL';
```

with

```
TTypArray = Array[1..4] Of pAnsiChar
```

```
TDataArray = Array[1..4] Of Record
    O_UnitNo: LongInt;
    O_Q, O_Qmin, O_Qmax, O_QU, O_TC, O_DT, O_DTU: Double;
    O_Op, O_FCF, O_FCFmin, O_FCFmax: LongInt;
    O_P, O_I, O_M, O_PF: Double;
    O_MC, O_VR: pAnsiChar;
    O_Net, O_DS, O_OV: LongInt
End
```

10.2 Function CopyDesign

Performance data for a given condensing unit respectively
selection of maximum four condensing units with capacity given

Exported function of LLH52.DLL: CopyDesign
Input parameters

Exported function of LLH52.DLL: CopyDesign		
I_RPath	pChar	path of refrigerant fluid files *.REF ('ASEREP')
I_NPath	pChar	path of name plate data files BNPA*.DAT
I_Flags	LongInt	preset data (see chapter 10.3)
I_Serie	LongInt	series (see chapter 10.4)
I_Typ	pChar	condenser unit type (see chapter 13)
I_CC	LongInt	0 – reserved for future use
I_Ref	pChar	refrigerant (see chapter 13)
I_Q	Double	cooling capacity in kW or kBtu/h
I_T0	Double	evaporation temperature in °C or °F
I_Tamb	Double	ambient temperature in °C or °F
I_TS	Double	suction gas temperature in °C / °F or superheat in K / °F dependent on I_Flags
I_TN	Double	useful superheat in K or °F
I_Net	LongInt	three-digit motor index (see chapter 13)
I_DS ⁴²	LongInt	motor winding type: 1 = delta, 2 = star, 3 = part winding (see chapter 13)
I_OV ⁴²	LongInt	operating voltage (see chapter 13)
I_FI	LongInt	frequency inverter: 0 = without, 1 = internal, 2 = external FI
I_FCF ^{42 43}	Double	selected FI frequency in Hz
I_FCV ⁴³	LongInt	supply voltage in V
I_FCOF ⁴³	LongInt	supply frequency in Hz
I_FCMV ⁴³	LongInt	0 – reserved for future use (max. output voltage in V)
I_Op	LongInt	operating mode (see chapter 10.6)
O_OpF ⁴³	LongInt	Ecostar mode: 0 = economy, 1 = low sound
I_CR ⁴⁴	Single	100 – reserved for future use (capacity control step in %)
Output parameters		
O_NUnit	LongInt	number of selected units (0 ... 4)
O_Typ1	pChar	selected condensing unit 1 (motor code included)
O_Typ2	pChar	selected condensing unit 2 (motor code included)
O_Typ3	pChar	selected condensing unit 3 (motor code included)
O_Typ4	pChar	selected condensing unit 4 (motor code included)
O_SzTTyp	TSzAry	length of O_Typ1...O_Typ4 without spaces
O_VR1	pChar	voltage range unit 1
O_VR2	pChar	voltage range unit 2
O_VR3	pChar	voltage range unit 3
O_VR4	pChar	voltage range unit 4
O_SzTVR	TSzAry	length of O_VR1...O_VR4 without spaces
O_TDb1	TDb1Ary	data of selected condenser units
O_TInt	TIntAry	data of selected condenser units
O_Hint1, O_Hint2, O_Hint3	LongInt	hint(s) (see chapter 1.4 and 1.5 and 1.6)
O_Err	pChar	supplement to error message
O_SzErr	LongInt	length of O_Err without spaces
CopyDesign	LongInt	error message (see chapter 1.3)
Data fields of array O_TDb1		
O_Q	Double	cooling capacity in kW or kBtu/h
O_Qmin ⁴³	Double	minimum cooling capacity in kW or kBtu/h
O_Qmax ⁴³	Double	maximum cooling capacity in kW or kBtu/h
O_QU	Double	evaporator capacity in kW or kBtu/h
O_QC	Double	Condenser capacity in kW or kBtu/h
O_TC	Double	condensing temperature in °C or °F
O_DT	Double	condensing temperature - ambient temperature temperature difference in K or °F
O_DTU	Double	liquid subcooling in K or °F
O_P	Double	power consumption in kW
O_I	Double	current in A
O_M	Double	refrigerant mass flow in kg/h or lb/h
O_PF ⁴³	Double	fan power consumption in kW
Data fields of array O_TInt		

Exported function of LLH52.DLL: CopyDesign		
O_UnitNo	LongInt	serial number of condensing unit
O_Op	LongInt	operating mode (see chapter 10.6)
O_FCF ⁴³	LongInt	inverter frequency in Hz
O_FCFmin ⁴³	LongInt	inverter frequency for minimum cooling capacity in Hz
O_FCFmax ⁴³	LongInt	inverter frequency for maximum cooling capacity in Hz
O_Net	LongInt	three-digit motor index (see chapter 13)
O_DS	LongInt	motor winding type: 1 = delta, 2 = star, 3 = part winding
O_OV	LongInt	operating voltage in V

Declaration with Borland Delphi® since version 2009:

```
Function CopyDesign(I_RPath, I_NPath: pAnsiChar; I_Flags, I_Serie:
    LongInt;
    I_Typ: pAnsiChar; I_CC: LongInt; I_Ref: pAnsiChar; I_Q,
    I_Tamb, I_TC, I_TS, I_TN: Double;
    I_Net, I_DS, I_OV, I_FI: LongInt; I_FCF: Double;
    I_FCV, I_FCOF, I_FCMV, I_Op, I_OpF: LongInt; I_CR: Single;
    Var O_NUnit: LongInt;
    O_Typ1, O_Typ2, O_Typ3, O_Typ4: pAnsiChar; Var O_SzTTyp:
    TSzAry;
    O_VR1, O_VR2, O_VR3, O_VR4: pAnsiChar; Var O_SzTVR: TSzAry;
    Var O_TDbl: TDblAry; Var O_TInt: TIntAry;
    Var O_Hint1, O_Hint2, O_Hint3: LongInt; O_Err: pAnsiChar;
    Var O_SzErr: LongInt):
    LongInt; StdCall; External 'LLH52.DLL';
```

with

```
TSzAry = Array[1..4] Of LongInt;

TDblAry = Array[1..4] Of Record
    O_Q, O_Qmin, O_Qmax, O_QU, O_TC, O_DT, O_DTU, O_P, O_I, O_M,
    O_PF: Double;
End;

TIntAry = Array[1..4] Of Record
    O_UnitNo, O_Op, O_FCF, O_FCFmin, O_FCFmax, O_Net, O_DS, O_OV:
    LongInt;
End;
```

Buffer variables in calling program:

```
Var
    Typ1Buf, Typ2Buf, Typ3Buf, Typ4Buf: AnsiString;
    VR1Buf, VR2Buf, VR3Buf, VR4Buf: AnsiString;
    ErrorBuf: AnsiString;
```

Initialization:

```

SetLength(Typ1Buf, 30);
SetLength(Typ2Buf, 30);
SetLength(Typ3Buf, 30);
SetLength(Typ4Buf, 30);
SetLength(VR1Buf, 7);
SetLength(VR2Buf, 7);
SetLength(VR3Buf, 7);
SetLength(VR4Buf, 7);
SetLength(ErrorBuf, 20);

O_Typ1:=@Typ1Buf[1]; or: O_Typ1:=pAnsiChar(Typ1Buf);
O_Typ2:=@Typ2Buf[1]; or: O_Typ2:=pAnsiChar(Typ2Buf);
O_Typ3:=@Typ3Buf[1]; or: O_Typ3:=pAnsiChar(Typ3Buf);
O_Typ4:=@Typ4Buf[1]; or: O_Typ4:=pAnsiChar(Typ4Buf);
O_VR1:=@VR1Buf[1]; or: O_VR1:=pAnsiChar(VR1Buf);
O_VR2:=@VR2Buf[1]; or: O_VR2:=pAnsiChar(VR2Buf);
O_VR3:=@VR3Buf[1]; or: O_VR3:=pAnsiChar(VR3Buf);
O_VR4:=@VR4Buf[1]; or: O_VR4:=pAnsiChar(VR4Buf);
O_Err:=@ErrorBuf[1]; or: O_Err:=pAnsiChar(ErrorBuf);

```

Declaration with Microsoft Visual Basic®:

```

Declare Function CopyDesign Lib "LLH52.DLL" _
    (ByVal I_RPath As String, ByVal I_NPath As String, ByVal
    I_Flags As Long, _
    ByVal I_Serie As Long, ByVal I_Typ As String, ByVal I_CC As
    Long, _
    ByVal I_Ref As String, ByVal I_Q As Double, ByVal I_T0 As
    Double, _
    'By Val I_Tamb As Double, ByVal I_TS As Double, ByVal I_TN
    As Double, _
    ByVal I_Net As Long, ByVal I_DS As Long, ByVal I_OV As Long,
    _
    ByVal I_FI As Long, ByVal I_FCF As Double, ByVal I_FCV As
    Long, _
    ByVal I_FCOF As Long, ByVal I_FCMV As Long, ByVal I_Op As
    Long, _
    ByVal I_OpF As Long, ByVal I_CR As Single, _
    ByRef O_NUnit As Long, _
    ByVal O_Typ1 As String, ByVal O_Typ2 As String, ByVal O_Typ3
    As String, _
    ByVal O_Typ4 As String, ByRef O_SzTTyp As TSzAry, _
    ByVal O_VR1 As String, ByVal O_VR2 As String, ByVal O_VR3 As
    String, _
    ByVal O_VR4 As String, ByRef O_SzTVR As TSzAry, _
    ByRef O_TDbl As TDb1Ary, ByRef O_TInt As TIntAry, _
    ByRef O_Hint1 As Long, ByRef O_Hint2 As Long, ByRef O_Hint3
    As Long, ByVal O_Err As String, _
    ByRef O_SzErr As Long) As Long with

Type TSzAry
    TSz(1 To 4) As Long
End Type

```

```

Type TDblRec
    O_Q As Double
    O_Qmin As Double
    O_Qmax As Double
    O_QU As Double
    O_TC As Double
    O_DT As Double
    O_DTU As Double
    O_P As Double
    O_I As Double
    O_M As Double
    O_PF As Double
End Type

Type TDblAry
    TDbl (1 To 4) As TDblRec
End Type

Type TIntRec
    O_UnitNo As Long
    O_Op As Long
    O_FCF As Long
    O_FCFmin As Long
    O_FCFmax As Long
    O_Net As Long
    O_DS As Long
    O_OV As Long
End Type

Type TIntAry
    TInt(1 To 4) As TIntRec
End Type

```

Buffer variables in calling program:

```

Dim O_Typ1 As String * 30
Dim O_Typ2 As String * 30
Dim O_Typ3 As String * 30
Dim O_Typ4 As String * 30
Dim O_VR1 As String * 7
Dim O_VR2 As String * 7
Dim O_VR3 As String * 7
Dim O_VR4 As String * 7
Dim O_Err As String * 20

```

10.3 Allowed values of I_Flags

Value	Constant	Meaning	
1	CalcWithIPUnits	0	SI units
		1	IP units

Value	Constant	Meaning	
2	CalcWithCapacity	0	compressor type given
		2	capacity given
4	CalcWithSuperheat	0	input suction gas temperature
		4	input suction superheat
8	CalcWithUsefulSuperheat	0	
		8	reserved
16	CalcWithSubcooling	0	
		16	reserved
32	CalcWithSubcooler	0	
		32	reserved
64	CalcWithSeaWater	0	
		64	reserved
128	CalcWithMiddleTemp	0	based on dew point temperatures
		128	based on mean temperatures
256	CalcWithFan	0	
		256	reserved
512	CalcWithTandem	0	units with single compressors
		512	units with tandem compressors
			(required only for capacity given)
16384	CalcWithExpansion	0	
		16384	reserved
32768	CalcWithLPDrop	0	
		32768	reserved
65536	CalcWithHPDrop	0	
		65536	reserved
131072	CalcWithEcoStar	reserved for FI compressors	
		0	single compressor mode
		131072	EcostarÖ mode
262144	CalcWithHeatPump	0	
		262144	reserved

10.4 Allowed values of I_Serie

I_Serie	Series	Description
1	LHE series	"standard" version
2	LHE series	for high ambient temperatures "high ambient" version
3	LHQ series ⁴⁵	noise reduced "quiet" version
4	LD series ⁴⁵	version "with 2 condenser fans"
5	ECOSTAR	plug-and-play concept with frequency regulated VARISPEED compressors
6	ECOLITE	plug-and-play concept for simple system integration

10.5 Allowed values of I_CR

Compressors	CR capacity control steps (%)
2-cylinder	100
4-cylinder	100, 50
6-cylinder	100, 66, 33

Compressors	CR capacity control steps (%)
8-cylinder	100, 50, 25
2×2-cylinder Tandem	100, 50
2×4-cylinder Tandem	100, 75, 50, 25
2×6-cylinder Tandem	100, 83, 66, 50, 33, 17

10.6 Allowed values of I_OP

0	automatic selection (standard)	
1	forced to suction gas cooling resp. Standard SL(A)	
2	forced to VARICOOL direkt suction SL(B)	(I_Ref = R22 only)
3	forced to CIC	(I_Ref = R22 only)
4	forced to Booster	(I_Ref in {R22, R404A, R507A} only)

⁴² only interpreted if type given

⁴³ frequency inverter operation – parameters I_NET, I_DS, and I_OV are ignored

⁴⁴ not possible with frequency inverter operation

⁴⁵ only in subprogram „Unit Type“ with former types

11 Air-cooled condensing units 2-stage („LSH“)

→ LLSH51.DLL

Attention! For calculation BNP50.DLL, SHK51.DLL and ASEREP32.DLL have to be in the same directory as LLSH51.DLL.

Calling convention "stdCall" in Delphi-Pascal corresponds to "__stdcall" in C++

11.1 Function Design

Performance data for a given condensing unit respectively
selection of maximum four condensing units with capacity given

Exported function of LLSH51.DLL: Design		
Input parameters		
I_RPath	pChar	path of refrigerant fluid files *.REF ('ASEREP')
I_NPath	pChar	path of name plate data files BNPA*.DAT
I_Flags	LongInt	preset data (see chapter 11.3)
I_Serie	LongInt	series (only "1")
I_Typ	pChar	condenser unit type (see chapter 13)
I_CC	LongInt	0 – reserved for future use
I_Ref	pChar	refrigerant (see chapter 13)
I_Q	Double	cooling capacity in kW or kBtu/h
I_T0	Double	evaporation temperature in °C or °F
I_Tamb	Double	ambient temperature in °C or °F
I_TS	Double	suction gas temperature in °C / °F or superheat in K / °F dependent on I_Flags
I_TN	Double	useful superheat in K or °F
I_Net	LongInt	three-digit motor index (see chapter 13)
I_DS ⁴⁶	LongInt	motor winding type: 1 = delta, 2 = star, 3 = part winding (see chapter 13)
I_OV ⁴⁶	LongInt	operating voltage (see chapter 13)
I_FCF ^{46 47}	LongInt	selected FI frequency in Hz
I_FCV ⁴⁷	LongInt	supply voltage in V
I_FCOF ⁴⁷	LongInt	supply frequency in Hz
I_FCMV ⁴⁷	LongInt	0 – reserved for future use (max. output voltage in V)
I_Op	LongInt	reserved (operating mode)
Output parameters		
O_NUnit	LongInt	number of selected units (0 ... 4)
O_TTyp	TTypAry	selected condensing units 1 ... O_NUnit
O_TData	TDataAry	data of selected condenser units
O_Hint1, O_Hint2	LongInt	hint(s) (see chapter 1.4 and 1.5)
O_Err	pChar	supplement to error message
Design	LongInt	error message (see chapter 1.3)
Data fields of array TData		
O_UnitNo	LongInt	serial number of condensing unit
O_Q	Double	cooling capacity in kW or kBtu/h
O_QU	Double	evaporator capacity in kW or kBtu/h
O_TC	Double	condensing temperature in °C or °F
O_DT	Double	condensing temperature - ambient temperature temperature difference in K or °F
O_DTU	Double	liquid subcooling in K or °F
O_Op	LongInt	operating mode (see chapter 11.5)

Exported function of LLSH51.DLL: Design		
O_P	Double	power consumption in kW
O_I	Double	current in A
O_ML	Double	refrigerant mass flow (LP) in kg/h or lb/h
O_MH	Double	refrigerant mass flow (HP) in kg/h or lb/h
O_MC	pChar	motor code for compressor designation
O_VR	pChar	voltage range
O_Net	LongInt	three-digit motor index (see chapter 13)
O_DS	LongInt	motor winding type: 1 = delta, 2 = star, 3 = part winding
O_OV	LongInt	operating voltage in V

Declaration with Borland Delphi® since version 2009:

```
Function Design(I_RPath, I_NPath: pAnsiChar; I_Flags, I_Serie:
    LongInt; I_Typ: pAnsiChar;
    I_CC: LongInt; I_Ref: pAnsiChar; I_Q, I_T0, I_Tamb, I_TS,
    I_TN: Double;
    I_Net, I_DS, I_OV, I_FCF, I_FCV, I_FCOF, I_FCMV, I_Op:
    LongInt;
    Var O_NUnit: LongInt; Var O_TTyp: TTypAry; Var O_TData:
    TDataAry;
    Var O_Hint1, O_Hint2: LongInt; Var O_Err: pAnsiChar):
    LongInt; StdCall; External 'LLSH51.DLL';
```

with

```
TTypAry = Array[1..4] Of pAnsiChar
```

```
TDataAry = Array[1..4] Of Record
    O_UnitNo: LongInt;
    O_Q, O_QU, O_TC, O_DT, O_DTU: Double;
    O_Op: LongInt;
    O_P, O_I, O_ML, O_MH: Double;
    O_MC, O_VR: pChar;
    O_Net, O_DS, O_OV: LongInt
End
```

11.2 Function CopyDesign

Performance data for a given condensing unit respectively
selection of maximum four condensing units with capacity given

Exported function of LLSH51.DLL: CopyDesign		
Input parameters		
I_RPath	pChar	path of refrigerant fluid files *.REF ('ASEREP')
I_NPath	pChar	path of name plate data files BNPA*.DAT
I_Flags	LongInt	preset data (see chapter 11.3)
I_Serie	LongInt	series (only "1")
I_Typ	pChar	condenser unit type (see chapter 13)
I_CC	LongInt	0 – reserved for future use
I_Ref	pChar	refrigerant (see chapter 13)
I_Q	Double	cooling capacity in kW or kBtu/h
I_T0	Double	evaporation temperature in °C or °F

Exported function of LLSH51.DLL: CopyDesign		
I_Tamb	Double	ambient temperature in °C or °F
I_TS	Double	suction gas temperature in °C / °F or superheat in K / °F dependent on I_Flags
I_TN	Double	useful superheat in K or °F
I_Net	LongInt	three-digit motor index (see chapter 13)
I_DS ⁴⁶	LongInt	motor winding type: 1 = delta, 2 = star, 3 = part winding (see chapter 13)
I_OV ⁴⁶	LongInt	operating voltage (see chapter 13)
I_FCF ^{46 47}	LongInt	selected FI frequency in Hz
I_FCV ⁴⁷	LongInt	supply voltage in V
I_FCOF ⁴⁷	LongInt	supply frequency in Hz
I_FCMV ⁴⁷	LongInt	0 – reserved for future use (max. output voltage in V)
I_Op	LongInt	reserved (operating mode)
Output parameters		
O_NUnit	LongInt	number of selected units (0 ... 4)
O_Typ1	pChar	selected condensing unit 1
O_Typ2	pChar	selected condensing unit 2
O_Typ3	pChar	selected condensing unit 3
O_Typ4	pChar	selected condensing unit 4
O_SzTTyp	TSzTArray	length of O_Typ1...O_Typ4 without spaces
O_VR1	pChar	voltage range unit 1
O_VR3	pChar	voltage range unit 2
O_VR3	pChar	voltage range unit 3
O_VR4	pChar	voltage range unit 4
O_SzTVR	TSzTArray	length of O_VR1...O_VR4 without spaces
O_TDb1	TDb1Array	data of selected condenser units
O_TInt	TIntArray	data of selected condenser units
O_Hint1, O_Hint2	LongInt	hint(s) (see chapter 1.4 and 1.5)
O_Err	pChar	supplement to error message
O_SzErr	LongInt	length of O_Err without spaces
CopyDesign	LongInt	error message (see chapter 1.3)
Data fields of array TDb1		
O_Q	Double	cooling capacity in kW or kBtu/h
O_QU	Double	evaporator capacity in kW or kBtu/h
O_TC	Double	condensing temperature in °C or °F
O_DT	Double	condensing temperature - ambient temperature temperature difference in K or °F
O_DTU	Double	liquid subcooling in K or °F
O_P	Double	power consumption in kW
O_I	Double	current in A
O_ML	Double	refrigerant mass flow (LP) in kg/h or lb/h
O_MH	Double	refrigerant mass flow (HP) in kg/h or lb/h
Data fields of array TInt		
O_UnitNo	LongInt	serial number of condensing unit
O_Op	LongInt	operating mode (see chapter 11.5)
O_Net	LongInt	three-digit motor index (see chapter 13)
O_DS	LongInt	motor winding type: 1 = delta, 2 = star, 3 = part winding
O_OV	LongInt	operating voltage in V

Declaration with Borland Delphi® since version 2009:

```
Function CopyDesign(I_RPath, I_NPath: pAnsiChar; I_Flags, I_Serie:
    LongInt;
    I_Typ: pAnsiChar; I_CC: LongInt; I_Ref: pAnsiChar; I_Q,
    I_Tamb, I_TC, I_TS, I_TN: Double;
    I_Net, I_DS, I_OV, I_FCF, I_FCV, I_FCOF, I_FCMV, I_Op:
    LongInt;
    Var O_NUnit: LongInt;
```

```
O_Typ1, O_Typ2, O_Typ3, O_Typ4: pAnsiChar; Var O_SzTTyp:
TSzAry;
O_VR1, O_VR2, O_VR3, O_VR4: pAnsiChar; Var O_SzTVR: TSzAry;
Var O_TDbl: TDblAry; Var O_TInt: TIntAry;
Var O_Hint1, O_Hint2: LongInt; O_Err: pAnsiChar; Var
O_SzErr: LongInt):
LongInt; StdCall; External 'LLSH51.DLL';
```

with

```
TSzTAry = Array[1..4] Of LongInt;

TDblAry = Array[1..4] Of Record
    O_Q, O_QU, O_TC, O_DT, O_DTU, O_P, O_I, O_ML, O_MH: Double
End;

TIntAry = Array[1..4] Of Record
    O_UnitNo, O_Op, O_Net, O_DS, O_OV: LongInt
End;
```

Buffer variables in calling program:

```
Var
    Typ1Buf, Typ2Buf, Typ3Buf, Typ4Buf: AnsiString;
    VR1Buf, VR2Buf, VR3Buf, VR4Buf: AnsiString;
    ErrorBuf: AnsiString;
```

Initialization:

```
SetLength(Typ1Buf, 30);
SetLength(Typ2Buf, 30);
SetLength(Typ3Buf, 30);
SetLength(Typ4Buf, 30);
SetLength(VR1Buf, 7);
SetLength(VR2Buf, 7);
SetLength(VR3Buf, 7);
SetLength(VR4Buf, 7);
SetLength(ErrorBuf, 20);

O_Typ1:=@Typ1Buf[1]; or: O_Typ1:=pAnsiChar(Typ1Buf);
O_Typ2:=@Typ2Buf[1]; or: O_Typ2:=pAnsiChar(Typ2Buf);
O_Typ3:=@Typ3Buf[1]; or: O_Typ3:=pAnsiChar(Typ3Buf);
O_Typ4:=@Typ4Buf[1]; or: O_Typ4:=pAnsiChar(Typ4Buf);
O_VR1:=@VR1Buf[1]; or: O_VR1:=pAnsiChar(VR1Buf);
O_VR2:=@VR2Buf[1]; or: O_VR2:=pAnsiChar(VR2Buf);
O_VR3:=@VR3Buf[1]; or: O_VR3:=pAnsiChar(VR3Buf);
O_VR4:=@VR4Buf[1]; or: O_VR4:=pAnsiChar(VR4Buf);
O_Err:=@ErrorBuf[1]; or: O_Err:=pAnsiChar(ErrorBuf);
```

Declaration with Microsoft Visual Basic®:

```

Declare Function CopyDesign Lib "LLSH51.DLL" _
    (ByVal I_RPath As String, ByVal I_NPath As String, ByVal
    I_Flags As Long, _
    ByVal I_Serie As Long, ByVal I_Typ As String, ByVal I_CC As
    Long, _
    ByVal I_Ref As String, ByVal I_Q As Double, ByVal I_T0 As
    Double, _
    By Val I_Tamb As Double, ByVal I_TS As Double, ByVal I_TN As
    Double, _
    ByVal I_Net As Long, ByVal I_DS As Long, ByVal I_OV As Long,
    _
    ByVal I_FCF As Long, ByVal I_FCV As Long, ByVal I_FCOF As
    Long, _
    ByVal I_FCMV As Long, ByVal I_Op As Long, _
    ByRef O_NUnit As Long, _
    ByVal O_Typ1 As String, ByVal O_Typ2 As String, ByVal O_Typ3
    As String, _
    ByVal O_Typ4 As String, ByRef O_SzTTyp As TSzAry, _
    ByVal O_VR1 As String, ByVal O_VR2 As String, BxVal O_VR3 As
    String, _
    ByVal O_VR4 As String, ByRef O_SzTVR As TSzAry, _
    ByRef O_TDbl As TDblAry, ByRef O_TInt As TIntAry, _
    ByRef O_Hint1 As Long, ByRef O_Hint2 As Long, ByVal O_Err As
    String, _
    ByRef O_SzErr As Long) As Long

```

with

```

Type TSzAry
    TSz(1 To 4) As Long
End Type

```

```

Type TDblRec
    O_Q As Double
    O_QU As Double
    O_TC As Double
    O_DT As Double
    O_DTU As Double
    O_P As Double
    O_I As Double
    O_ML As Double
    O_MH As Double
End Type

```

```

Type TDblAry
    TDbl(1 To 4) As TDataRec
End Type

```

```

Type TIntRec
    O_UnitNo As Long
    O_Op As Long
    O_Net As Long
    O_DS As Long
    O_OV As Long
End Type

Type TIntAry
    TInt(1 To 4) As TIntRec
End Type

```

Buffer variables in calling program:

```

Dim O_Typ1 As String * 30
Dim O_Typ2 As String * 30
Dim O_Typ3 As String * 30
Dim O_Typ4 As String * 30
Dim O_VR1 As String * 7
Dim O_VR2 As String * 7
Dim O_VR3 As String * 7
Dim O_VR4 As String * 7
Dim O_Err As String * 20

```

11.3 Allowed values of I_Flags

Value	Constant	Meaning	
1	CalcWithIPUnits	0	SI units
		1	IP units
2	CalcWithCapacity	0	compressor type given
		2	capacity given
4	CalcWithSuperheat	0	input suction gas temperature
		4	input suction superheat
8	CalcWithUsefulSuperheat	0	
		8	reserved
16	CalcWithSubcooling	0	
		16	reserved
32	CalcWithSubcooler	0	without subcooler
		32	with subcooler
64	CalcWithSeaWater	0	
		64	reserved
128	CalcWithMiddleTemp	0	based on dew point temperatures
		128	based on mean temperatures
256	CalcWithFan	0	
		256	reserved
512	CalcWithTandem	0	
		512	reserved
16384	CalcWithExpansion	0	
		16384	reserved
32768	CalcWithLPDrop	0	
		32768	reserved

Value	Constant	Meaning
65536	CalcWithHPDrop	0 65536 reserved
131072	CalcWithEcoStar	reserved for FI compressors 0 single compressor mode 131072 EcostarÖ mode
262144	CalcWithHeatPump	0 262144 reserved

11.4 Allowed value of I_Serie

I_Serie	Series	Description
1	LHE series	"standard" version

11.5 Allowed value of I_OP

0	automatic selection (standard)
---	--------------------------------

⁴⁶ only interpreted if type given

⁴⁷ frequency inverter operation – reserved for future use

12 Water-cooled condensers ("WV") → LWV50.DLL

Attention! For calculation RK_1A32.DLL, RK_R32A.DLL, STOFF32.DLL and ASEREP32.DLL have to be in the same directory as LWV50.DLL.

Calling convention "stdCall" in Delphi-Pascal corresponds to "__stdcall" in C++

12.1 Obligatory input data in function Design and CopyDesign

12.1.1 Condenser type given (CalcWithCapacity = 0)

I_Path	
I_Flags	Preset: SI units, standard design
I_Ref	
I_Medium	for brine (I_Medium=2,3,4): concentration I_conc
I_Typ	
I_Pass	condenser capacity (I_QC<>0) or liquid temperature (I_QC=0)
I_TWI	volume flow (I_Vol<>0) or water outlet temperature (I_Vol=0)
I_DTU	
I_Ri	
I_DGT	Discharge gas temperature

12.1.2 Capacity given (CalcWithCapacity = 2)

I_Path	
I_Flags	Preset: SI units, standard design
I_Ref	
I_Medium	for brine (I_Medium=2,3,4): concentration I_conc
I_QC	
I_TC	
I_TWI	
I_DTU	

I_Ri	
I_DGT	Discharge gas temperature

12.2 Function Design

Performance data for a given condenser type respectively
selection of maximum four condenser types with capacity given

Exported function of LWV50.DLL: Design		
Input parameters		
I_Path	pChar	path of refrigerant fluid files *.REF ('ASEREP')
I_Flags	LongInt	preset data (see chapter 12.6)
I_Typ	pChar	condenser type (see chapter 13)
I_Ref	pChar	refrigerant (see chapter 13)
I_Medium	LongInt	cooling agent (see chapter 12.7)
I_Pass	LongInt	number of passes (2 or 4)
I_QC	Double	condenser capacity in kW or kBtu/h
I_TC	Double	condensing temperature in °C or °F
I_DTU	Double	liquid subcooling in K or °F
I_TWI	Double	water inlet temperature in °C or °F
I_TWO	Double	water outlet temperature in °C or °F
I_Vol	Double	volflow in m³/h or ft³/h
I_Ri	Double	fouling factor inside in m²K/W (0 .. 0.00045)
I_Conc	Double	brine concentration in %
I_DGT	Double	discharge gas temperature in °C or °F
Output parameters		
O_NCond	LongInt	number of selected condensers (0 .. 4)
O_TTyp	TTypAry	type of selected condensers 1 .. O_NCond
O_TData	TDataAry	data of selected condensers
O_Hint	LongInt	hint(s) (see chapter 1.4)
O_Err	pChar	supplement to error message
Design	LongInt	error message (see chapter 1.3)
Data fields of array O_TData:		
O_TypNo	LongInt	serial number of condenser (1 .. 14)
O_Pass	LongInt	number of passes (2 or 4)
O_QC	Double	condenser capacity in kW or kBtu/h
O_TC	Double	condensing temperature in °C or °F
O_TWA	Double	water outlet temperature in °C or °F
O_VI	Double	volflow in m³/h or ft³/h
O_WI	Double	flow velocity in m/s or ft/s
O_DP	Double	pressure drop in bar or psi

Declaration with Borland Delphi® since version 2009:

```
Function Design(I_Path: pAnsiChar; I_Flags: LongInt; I_Typ, I_Ref:
    pAnsiChar;
    I_Medium, I_Pass: LongInt;
    I_QC, I_TC, I_DTU, I_TWI, I_TWO, I_VOL, I_Ri, I_Conc:
    Double;
    Var O_NCond: LongInt; Var O_TTyp: TTypAry; Var O_TData:
    TDataAry;
    Var O_Hint: LongInt; Var O_Err: pAnsiChar): LongInt;
StdCall; External 'LWV50.DLL';
```

with

```
TTypAry = Array[1..4] Of pAnsiChar;

TDataAry = Array[1..4] Of Record
    O_TypNo: LongInt;
    O_Pass: LongInt;
    O_QC, O_TC, O_TWA, O_VI, O_WI, O_DP: Double
End;
```

12.3 Function CopyDesign

Performance data for a given condenser type respectively
selection of maximum four condenser types with capacity given

Exported function of LWV50.DLL: CopyDesign		
Input parameters		
I_Path	pChar	path of refrigerant fluid files *.REF ('ASEREP')
I_Flags	LongInt	preset data (see chapter 12.6)
I_Typ	pChar	condenser type (see chapter 13)
I_Ref	pChar	refrigerant (see chapter 13)
I_Medium	LongInt	cooling agent (see chapter 12.7)
I_Pass	LongInt	number of passes (2 or 4)
I_QC	Double	condenser capacity in kW or kBtu/h
I_TC	Double	condensing temperature in °C or °F
I_DTU	Double	liquid subcooling in K or °F
I_TWI	Double	water inlet temperature in °C or °F
I_TWO	Double	water outlet temperature in °C or °F
I_Vol	Double	volflow in m³/h or ft³/h
I_Ri	Double	fouling factor inside in m²K/W (0 .. 0.00045)
I_Conc	Double	brine concentration in %
I_DGT	Double	discharge gas temperature in °C or °F
Output parameters		
O_NCond	LongInt	number of selected condensers (0 .. 4)
O_Typ1	pChar	type of selected condenser 1
O_Typ2	pChar	type of selected condenser 2
O_Typ3	pChar	type of selected condenser 3
O_Typ4	pChar	type of selected condenser 4
O_SzTTyp	TSzTTypAry	length of O_Typ1... O_Typ4 without spaces
O_TData	TDataAry	data of selected condensers
O_Hint	LongInt	hint(s) (see chapter 1.4)
O_Err	pChar	supplement to error message
O_SzErr	LongInt	length of O_Err without spaces
CopyDesign	LongInt	error message (see chapter 1.3)
Data fields of array O_TData:		
O_TypNo	LongInt	serial number of condenser (1 .. 14)
O_Pass	LongInt	number of passes (2 or 4)
O_QC	Double	condenser capacity in kW or kBtu/h
O_TC	Double	condensing temperature in °C or °F
O_TWA	Double	water outlet temperature in °C or °F
O_VI	Double	volflow in m³/h or ft³/h
O_WI	Double	flow velocity in m/s or ft/s
O_DP	Double	pressure drop in bar or psi

Declaration with Borland Delphi® since version 2009:

```
Function CopyDesign(I_Path: pAnsiChar; I_Flags: LongInt; I_Typ,
    I_Ref: pAnsiChar;
    I_Medium, I_Pass: LongInt;
    I_QC, I_TC, I_DTU, I_TWI, I_TWO, I_VOL, I_Ri, I_Conc, I_DGT:
    Double;
    Var O_NCond: LongInt;
    O_Typ1, O_Typ2, O_Typ3, O_Typ4: pAnsiChar; Var O_SzTTyp:
    TSzTTypAry;
    Var O_TData: TDataAry;
    Var O_Hint: LongInt; O_Err: pAnsiChar; Var O_SzErr:
    LongInt):
    LongInt; StdCall; External 'LWV50.DLL';
```

with

```
TSzTTypAry = Array[1..4] Of LongInt;

TDataAry = Array[1..4] Of Record
    O_TypNo: LongInt;
    O_Pass: LongInt;
    O_QC, O_TC, O_TWA, O_VI, O_WI, O_DP: Double
End;
```

Buffer variables in calling program:

```
Var
    Typ1Buf: AnsiString;
    Typ2Buf: AnsiString;
    Typ3Buf: AnsiString;
    Typ4Buf: AnsiString;
    ErrorBuf: AnsiString;
```

Initialization:

```
SetLength(Typ1Buf, 20);
SetLength(Typ2Buf, 20);
SetLength(Typ3Buf, 20);
SetLength(Typ4Buf, 20);
SetLength(ErrorBuf, 20);

O_Typ1:=@Typ1Buf[1]; or: O_Typ1:=pAnsiChar(Typ1Buf);
O_Typ2:=@Typ2Buf[1]; or: O_Typ2:=pAnsiChar(Typ2Buf);
O_Typ3:=@Typ3Buf[1]; or: O_Typ3:=pAnsiChar(Typ3Buf);
O_Typ4:=@Typ4Buf[1]; or: O_Typ4:=pAnsiChar(Typ4Buf);
O_Err:=@ErrorBuf[1]; or: O_Err:=pAnsiChar(ErrorBuf);
```

Declaration with Microsoft Visual Basic®:

```
Declare Function CopyDesign Lib "LWV50.DLL" _
    (ByVal I_Path As String, ByVal I_Flags As Long, ByVal I_Typ
    As String, _
    ByVal I_Ref As String, ByVal I_Medium As Long, ByVal I_Pass
    As Long, _
    ByVal I_QC As Double, By Val I_TC As Double, ByVal I_DTU As
    Double, _
    ByVal I_TWI As Double, ByVal I_TWO As Double, ByVal I_Vol As
    Double, _
    ByVal I_Ri As Double, ByVal I_Conc As Double, ByVal I_DGT as
    Double, _
    ByRef O_NCond As Long, ByVal O_Typ1 As String, _
    ByVal O_Typ2 As String, ByVal O_Typ3 As String, ByVal O_Typ4
    As String, _
    ByRef O_SzTTyp As TSzTTypAry, ByRef O_TData As TDataAry, _
    ByRef O_Hint As Long, ByVal O_Err As String, ByRef O_SzErr
    As Long) As Long
```

with

```
Type TSzTTypAry (1 To 4) As Long
```

```
Type TDataRec
    O_TypNo As Long
    O_Pass As Long
    O_QC As Double
    O_TC As Double
    O_TWA As Double
    O_VI As Double
    O_WI As Double
    O_DP As Double
End Type
```

```
Type TDataAry (1 To 4) As TdataRec
```

Buffer variables in calling program:

```
Dim O_Typ1 As String * 20
Dim O_Typ2 As String * 20
Dim O_Typ3 As String * 20
Dim O_Typ4 As String * 20
Dim O_Err As String * 20
```

12.4 Function CapacityCheck

Maximum condenser capacity

Exported function of LWV50.DLL: CapacityCheck		
Input parameters		
I_Flags	LongInt	preset data (see chapter 12.6)

Exported function of LWV50.DLL: CapacityCheck		
I_Typ	pChar	condenser type (see chapter 13)
I_Pass	LongInt	number of passes (2 or 4)
Output parameters		
O_QWmax	Double	maximum condenser capacity in kW or kBtu/h
CapacityCheck	LongInt	error message (see chapter 1.3)

Declaration with Borland Delphi® since version 2009:

```
Function CapacityCheck(I_Flags: LongInt; I_Typ: pAnsiChar; I_Pass:
    LongInt;
    Var O_QWmax: Double):
    LongInt; StdCall; External 'LWV50.DLL';
```

Declaration with Microsoft Visual Basic®:

```
Declare Function CapacityCheck Lib "LWV50.DLL" _
    (ByVal I_Flags As Long, ByVal I_Typ As String, ByVal I_Pass
    As Long, _
    ByRef O_QWmax As Double) As Long
```

12.5 Function VolflowCheck

Minimum and maximum volume flow

Exported function of LWV50.DLL: VolflowCheck		
Input parameters		
I_Flags	LongInt	preset data (see chapter 12.6)
I_Typ	pChar	condenser type (see chapter 13)
I_Pass	LongInt	number of passes (2 or 4)
Output parameters		
O_Vmax	Double	maximum velocity in m/s or ft/s
O_Volmin	Double	minimum volume flow in m³/h or ft³/h
O_Volmax	Double	maximum volume flow in m³/h or ft³/h
VolflowCheck	LongInt	error message (see chapter 1.3)

Declaration with Borland Delphi® since version 2009:

```
Function VolflowCheck(I_Flags: LongInt; I_Typ: pAnsiChar; I_Pass:
    LongInt;
    Var O_Vmax, O_Volmin, O_Volmax: Double):
    LongInt; StdCall; External 'LWV50.DLL';
```

Declaration with Microsoft Visual Basic®:

```
Declare Function VolflowCheck Lib "LWV50.DLL" _
    (ByVal I_Flags As Long, ByVal I_Typ As String, ByVal I_Pass
    As Long, _
    ByRef O_Vmax As Double, ByRef O_Volmin As Double, _
    ByRef O_Volmax As Double) As Long
```

12.6 Allowed values of I_Flags

Value	Constant	Meaning	
1	CalcWithIPUnits	0	SI units
		1	IP units
2	CalcWithCapacity	0	condenser type given
		2	capacity given
4	CalcWithSuperheat	0	
		4	reserved
8	CalcWithUsefulSuperheat	0	
		8	reserved
16	CalcWithSubcooling	0	
		16	reserved
32	CalcWithSubcooler	0	
		32	reserved
64	CalcWithSeaWater	0	standard design
		64	sea-water resistant
128	CalcWithMiddleTemp	0	
		128	reserved
256	CalcWithFan	0	
		256	reserved
512	CalcWithTandem	0	
		512	reserved
16384	CalcWithExpansion	0	
		16384	reserved
32768	CalcWithLPDrop	0	
		32768	reserved
65536	CalcWithHPDrop	0	
		65536	reserved
131072	CalcWithEcoStar	0	
		131072	reserved
262144	CalcWithHeatPump	0	
		262144	reserved

12.7 Allowed values of I_Medium

0	Water
1	Ethyleneglycol(Antifrogen-N)
2	Propyleneglycol(Antifrogen-L)
3	CaCl ₂
4	Tyfoxit1.15

13 Compressor name plate data→BNP50.DLL

Calling convention "stdCall" in Delphi-Pascal corresponds to "__stdcall" in C++

13.1 Function BNPMotors

List of selectable motors for compressors

Exported function of BNP50.DLL: BNPMotors		
Input parameters		
I_NPath	pChar	Path of name plate data files BNPA*.DAT, BNPB*.DAT, BNPE*.DAT
I_Typ	pChar	Compressor type (see chapter 13)
I_CC	LongInt	0-reserved for future use
I_Freq	LongInt	Frequency code:1=50Hz,2=60Hz,4=60HzUL
Output parameters		
O_Std	LongInt	1..n: position of standard motor in array O_Data
O_Data	TMotDataAry	Motor index,motor design,operating voltage,and motor code for all selectable motors
BNPMotors	LongInt	Error message (see chapter 1.3)
Data fields of array TMotDataAry		
Number	LongInt	three-digit motor index)
Design	LongInt	Motor winding type: 0=single-phase, 1=delta, 2=star, 3=part winding, 4=asynchronous
OpVolt	LongInt	Operating voltage in V
Motorcode	ShortString	Motor code for compressor designation

Declaration with Borland Delphi® since version 2009:

```
Function BNPMotors(I_NPath, I_Typ: pAnsiChar;
  I_CC, I_Freq: LongInt;
  Var O_Std: LongInt;
  Var O_Data: TMotDataAry): LongInt; StdCall; External
  'BNP50.DLL';
```

with

```
TMotDataAry=ArrayOfRecord
  Number: LongInt;
  Design: LongInt;
  OpVolt: LongInt;
  Motorcode: ShortString
End;
```

13.2 Function BNPStandard

Standard motor of compressors

Exported function of BNP50.DLL: BNPStandard		
Input parameters		
I_NPath	pChar	Path of name plate data files BNPA*.DAT, BNPB*.DAT, BNPE*.DAT
I_Typ	pChar	Compressor type (see chapter 13)

Exported function of BNP50.DLL: BNPStandard		
I_CC	LongInt	0–reserved for future use
I_Freq	LongInt	Frequency code: 1=50Hz, 2=60Hz, 4=60HzUL
Output parameters		
O_Number	LongInt	three-digit motor index
O_Design	LongInt	Motor winding type: 0=single-phase, 1=delta, 2=star, 3=part winding, 4=asynchronous
O_OpVolt	LongInt	Operating voltage in V
O_Factor	Single	Factor for calculation of operating current
O_MC	ShortString	Motor code for compressor designation
O_VR	ShortString	Voltage range
BNPStandard	LongInt	Error message (see chapter 1.3)

Declaration with Borland Delphi® since version 2009:

```
Function BNPStandard(I_NPath, I_Typ: pAnsiChar;
  I_CC, I_Freq: LongInt;
  Var O_Number, O_Design, O_OpVolt: LongInt;
  Var O_Factor: Single;
  Var O_MC, O_VR: ShortString): LongInt; StdCall; External
  'BNP50.DLL';
```

13.3 Function BNPCopyStandard

Standard motor of compressors

Exported function of BNP50.DLL: BNPCopyStandard		
Input parameters		
I_NPath	pChar	Path of name plate data files BNPA*.DAT, BNPB*.DAT, BNPE*.DAT
I_Typ	pChar	Compressor type (see chapter 13)
I_CC	LongInt	0–reserved for future use
I_Freq	LongInt	Frequency code: 1=50Hz, 2=60Hz, 4=60HzUL
Output parameters		
O_Number	LongInt	three-digit motor index
O_Design	LongInt	Motor winding type: 0=single-phase, 1=delta, 2=star, 3=part winding, 4=asynchronous
O_OpVolt	LongInt	Operating voltage in V
O_Factor	Single	Factor for calculation of operating current
O_MC	pChar	Motor code for compressor designation
O_SzMC	LongInt	Length of O_MC without spaces
O_VR	pChar	Voltage range
O_SzVR	LongInt	Length of O_VR without spaces
BNPCopyStandard	LongInt	Error message (see chapter 1.3)

Declaration with Borland Delphi® since version 2009:

```
Function BNPStandard(I_NPath, I_Typ: pAnsiChar;
  I_CC, I_Freq: LongInt;
  Var O_Number, O_Design, O_OpVolt: LongInt;
  Var O_Factor: Single;
  O_MC: pAnsiChar; Var O_SzMC: LongInt;
  O_VR: pAnsiChar; Var O_SzVR: LongInt): LongInt; StdCall;
  External 'BNP50.DLL';
```

Buffer variables in calling program:

```
Var
    MCBuf, VRBuf: AnsiString;
```

Initialization:

```
SetLength(MCBuf, 3);
SetLength(VRBuf, 7);
O_MC:=@MCBuf[1]; or: O_MC:=pAnsiChar(MCBuf);
O_VR:=@VRBuf[1]; or: O_VR:=pAnsiChar(VRBuf);
```

Declaration with Microsoft Visual Basic®:

```
Declare Function BNPCopyStandard Lib "BNP50.DLL" _
    (ByVal I_NPath As String, ByVal I_Typ As String, ByVal I_CC
    As Long, _
    ByVal I_Freq As Long, _
    ByRef O_Number As Long, ByRef O_Design As Long, ByRef
    O_OpVolt As Long, _
    ByRef O_Factor As Single, ByVal O_MC As String, ByRef O_SzMC
    As Long, _
    ByVal O_VR As String, ByRef O_SzVR As Long) As Long
```

Buffer variables in calling program:

```
DimO_MC As String*3
DimO_VR As String*7
```

13.4 Function BNPTechData

Technical data of compressors
output parameters for current as Single with multiplier

Exported function of BNP50.DLL: BNPTechData		
Inputparameters		
I_NPath	pChar	Path of name plate data files BNPA*.DAT, BNPB*.DAT, BNPE*.DAT
I_Typ	pChar	Compressor type (see chapter 13)
I_CC	LongInt	0-reserved for future use
I_Number	LongInt	three-digit motor index (see chapter 13)
I_Design	LongInt	Motor winding type: 0=single-phase, 1=delta, 2=star, 3=part winding, 4=asynchronous (see chapter 13)
I_OpVolt	LongInt	Operating voltage in V (see chapter 13)
Output parameters		
O_MC	pChar	Motor code for compressor designation
O_VR	pChar	Voltage range
O_WR	LongInt	Motor winding ratio (PW=part winding): 0: not a PW motor, 1: PW 50/50, 2: PW60/40
O_Mult	LongInt	Multiplier for succeeding current data: 1=single compressor, 2=tandem compressor
O_WC	Single	Maximum working current in A
O_SCy	Single	Starting current for part-winding start in A
O_SCyy	Single	Starting current in A

Exported function of BNP50.DLL: BNPTechData		
O_MCC	Single	Only 60Hz UL: Maximum Continuous Current MCC in A
O_RLA14	Single	Only 60Hz UL: Rated Load Amps RLA_1.4 in A
O_RLA15	Single	Only 60Hz UL: Rated Load Amps RLA_1.56 in A
BNPTechData	LongInt	Error message (see chapter 1.3)

Declaration with Borland Delphi® since version 2009:

```
Function BNPTechData(I_NPath, I_Typ: pAnsiChar;
  I_CC, I_Number, I_Design, I_OpVolt: LongInt;
  Var O_MC, O_VR: pAnsiChar;
  Var O_WR, O_Mult: LongInt;
  Var O_WC, O_SCy, O_SCyy, O_MCC, O_RLA14, O_RLA15: Single):
  LongInt;
  StdCall; External 'BNP50.DLL';
```

13.5 Function BNPCopyTechData

Technical data of compressors

output parameters for current as Single with multiplier

Exported function of BNP50.DLL: BNPCopyTechData		
Input parameters		
I_NPath	pChar	Path of name plate data files BNPA*.DAT, BNPB*.DAT, BNPE*.DAT
I_Typ	pChar	Compressor type (see chapter 13)
I_CC	LongInt	0=reserved for future use
I_Number	LongInt	three-digit motor index (see chapter 13)
I_Design	LongInt	Motor winding type: 0=single-phase, 1=delta, 2=star, 3=part winding, 4=asynchronous (see chapter 13)
I_OpVolt	LongInt	Operating voltage in V (see chapter 13)
Output parameters		
O_MC	pChar	Motor code for compressor designation
O_SzMC	LongInt	Length of O_MC without spaces
O_VR	pChar	Voltage range
O_SzVR	LongInt	Length of O_VR without spaces
O_WR	LongInt	Motor winding ratio (PW=part winding): 0: not a PW motor, 1: PW50/50, 2: PW60/40
O_Mult	LongInt	Multiplier for succeeding current data: 1=single compressor, 2=tandem compressor
O_WC	Single	Maximum working current in A
O_SCy	Single	Starting current for part-winding start in A
O_SCyy	Single	Starting current in A
O_MCC	Single	Only 60Hz UL: Maximum Continuous Current MCC in A
O_RLA14	Single	Only 60Hz UL: Rated Load Amps RLA_1.4 in A
O_RLA15	Single	Only 60Hz UL: Rated Load Amps RLA_1.56 in A
BNPCopyTechData	LongInt	Error message (see chapter 1.3)

Declaration with Borland Delphi® since version 2009:

```
Function BNPCopyTechData(I_NPath, I_Typ: pAnsiChar;
  I_CC, I_Number, I_Design, I_OpVolt: LongInt;
  O_MC: pAnsiChar; Var O_SzMC: LongInt;
  O_VR: pAnsiChar; Var O_SzVR: LongInt;
  Var O_WR, O_Mult: LongInt;
  Var O_WC, O_SCy, O_SCyy, O_MCC, O_RLA14, O_RLA15: Single):
  LongInt;
  StdCall; External 'BNP50.DLL';
```

Buffer variables in calling program:

```
Var
    MCBuf, VRBuf: AnsiString;
```

Initialization:

```
SetLength(MCBuf, 3);
SetLength(VRBuf, 7);

O_MC:=@MCBuf[1]; or: O_MC:=pAnsiChar(MCBuf);
O_VR:=@VRBuf[1]; or: O_VR:=pAnsiChar(VRBuf);
```

Declaration with Microsoft Visual Basic®:

```
Declare Function BNPCopyTechData Lib „BNP50.DLL“ _
    (ByVal I_NPath As String, ByVal I_Typ As String, ByVal I_CC
    As Long, _
    ByVal I_Number As Long, ByVal I_Design As Long, ByVal
    I_OpVolt As Long, _
    ByVal O_MC As String, ByRef O_SzMC As Long, _
    ByVal O_VR As String, ByRef O_SzVR As Long, _
    ByRef O_WR As Long, ByRef O_Mult As Long, ByRef O_WC As
    Single, _
    ByRef O_Scy As Single, ByRef O_SCyy As Single, ByRef O_MCC
    As Single, _
    ByRef O_RLA14 As Single, ByRef O_RLA15 As Single) As Long
```

Buffer variables in calling program:

```
Dim O_MC As String*3
Dim O_VR As String*7
```

13.6 Function BNPSTechData

Technical data of compressors

output parameters for current as pChar including unit of measurement and motor design

Exported function of BNP50.DLL: BNPSTechData		
Input parameters		
I_NPath	pChar	Path of name plate data files BNPA*.DAT, BNPB*.DAT, BNPE*.DAT
I_Typ	pChar	Compressor type (see chapter 13)
I_CC	LongInt	0–reserved for future use
I_Number	LongInt	three-digit motor index (see chapter 13)
I_Design	LongInt	Motor winding type: 0=single-phase, 1=delta, 2=star, 3=part winding, 4=asynchronous (see chapter 13)
I_OpVolt	LongInt	Operating voltage in V (see chapter 13)
Output parameters		

Exported function of BNP50.DLL: BNPSTechData		
O_MC	pChar	Motor code for compressor designation
O_VR	pChar	Voltage range
O_WR	LongInt	Motor winding ratio (PW=partwinding): 0: not a PW motor, 1: PW50/50, 2: PW60/40
O_Mult	LongInt	Number of compressors in compoundings: 1=single compressor, 2=tandem compressor,...
O_WC	pChar	Maximum working current including „A“
O_SCy	pChar	Starting current for part-winding start including „A“ plus motor design „D“ resp. „Y“
O_SCyy	pChar	Starting current including „A“ plus motor design „D“, DD“, resp.„YY“
O_MCC	Single	Only 60Hz UL: Maximum Continuous Current MCC in A
O_RLA14	Single	Only 60Hz UL: Rated Load Amps RLA 1.4 in A
O_RLA15	Single	Only 60Hz UL: Rated Load Amps RLA 1.56 in A
BNPSTechData	LongInt	Error message (see chapter 1.3)

Declaration with Borland Delphi® since version 2009:

```
Function BNPSTechData(I_NPath, I_Typ: pAnsiChar;
  I_CC, I_Number, I_Design, I_OpVolt: LongInt;
  Var O_MC, O_VR: pAnsiChar;
  Var O_WR, O_Mult: LongInt;
  Var O_WC, O_SCy, O_SCyy, O_MCC, O_RLA14, O_RLA15: pChar):
  LongInt;
  StdCall; External 'BNP50.DLL';
```

14 Allowed values of common input variables

14.1 I_Typ and I_Ref

To find a list of all types and the allowed refrigerants for each type, see list ***ManualProductList.csv***.

14.2 I_Net and I_Number, I_DS and I_Design, I_OV and I_OpVolt

To find a list of all available motors for each compressor, see ***ESC.csv***, ***HCS.csv***, ***HHK.csv***, ***HS.csv***, ***SHK.csv***. In these lists will be found the three digit motor index (commonly used as input variables I_Net or I_Number), the winding type (commonly used as input variables I_DS or I_Design) and the operating voltage (commonly used as input variables I_OV or I_OpVolt).