The Carel Driver

The Carel driver connects to a network of Carel air-conditioning and refrigeration packaged controls. Available for Commander and ObSys.

This document relates to Carel driver version 2.0

Please read the *Commander Manual* or *ObSys Manual* alongside this document, available from *www.northbt.com*

Contents

Compatibility with the Carel System

The Carel driver allows North to interface with a Carel air-conditioning and refrigeration packaged control system.

The driver connects via an RS485 serial connection to a network of Carel controllers, each fitted with an RS485 interface card (Fig. 1). Up to 32 controllers can be connected, dependant on model.

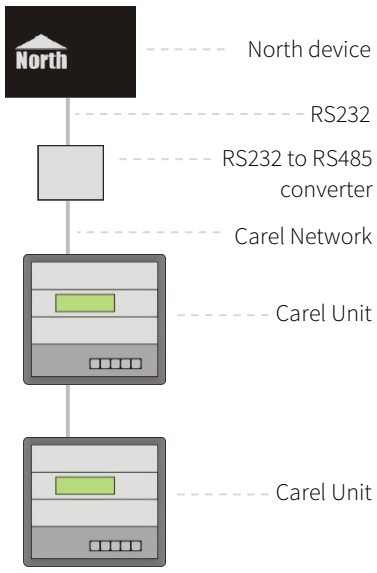

Fig. 1 North to Carel

Equipment

Carel controllers that are compatible with the driver include:

- pCO series – pCO, pCO1, pCO2, pCO3
- mP20
- AC/FCM, microAC

The following controls are also compatible, when using additional hardware:

- ASM2, mP3/hP3 – this requires an RS232 to RS422 converter for the COM port
- Chiller – requires a Carel ISA72 interface card

Carel OEM-controls may be branded by various air-conditioning and refrigeration companies, including:

- Airedale
- Climaventa
- Klima-Therm
- McQuay
- RC Group
- Trane
- Uniflair
- York

Values

The data from a controller is accessed from a list of analogue, integer and digital values. To understand these values you will need a list of data points from the manufacturer.

Depending on the model, brand, and application firmware, each controller can typically have the following values available:

- Remote start/stop
- Setpoint
- Alarm limits
- Output status
- Sensor values
- Alarm status

Prerequisites

The Carel controllers should be networked using the RS485 supervisor network. Each controller must be configured with a unique address in the range 1…207, and a baud rate of 19200 as described below.

An RS232-485 adapter is required and must be set to 19200 baud, 11 data bits.

You will require a list of the data points available in the Controller from the product distributor.

pCO2

Fit the RS485 serial card (ref. PCO2004850) to the serial card expansion slot in the pCO2 unit. From the display, access the user parameters by pressing the 'Prog' key. Enter the user password and configure the following parameters on page Pf:

Parameter	Value
Identific. number for BMS	1…200
Comm. Speed	19200
Protocol type	Carel

From the manufacturers parameters (accessed by pressing 'Menu' and 'Prog') the following parameter can also be set to allow control by the driver:

Menu	Parameter	Value
Configuration	BMS Network	Yes

pCO

Fit the RS485 serial card (ref. PCO1004850 or PCOSER0000) to the 9-pin connector J7 on the pCO board. If applicable, set the jumper to RS485 communication. From the display, access the service menu and configure the following parameters:

Menu	Parameter	Value
Remote Control	I/O via Serial	Yes
	Id #	1…16
	Speed	19200

AC

Fit the RS485 serial card (ref. MAC2SER000) to the AC display unit. From the AC display, access the user parameters by pressing the 'Alarm' key for 5 seconds. Enter the password and configure the following parameters:

Parameter	Description	Value
Ho	Address of AC on supervisor network	1…200
HP	Baud rate of supervisor network	5=19200

Using the Driver

On ObSys and Commander, the Carel driver is pre-installed. On all of these North devices, you can use the driver to create an interface to Carel. Once started, you will need to set up the driver before it can communicate with the Carel system.

Making the Cable

Connect the North device COM port to an RS232 to RS485 adapter.

Using the RS485 cable specification (Fig. 2), connect the RS485 adapter to the Carel RS485 card.

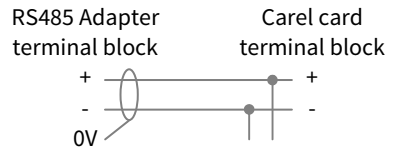

Fig. 2 RS485 adapter to Carel cable

RS485 adapters are available from North, order code MISC/RS232/485.

Starting the Interface

To start an interface using the Carel driver, follow these steps:

- → **Start Engineering** your North device using ObSys
- → Navigate to **Configuration, Interfaces,** and set an unused **Interface** to 'Carel' to start the particular interface
- → Navigate to the top-level of your North device and re-scan it

The driver setup object (Mc), labelled **Carel Setup**, should now be available. If this object is not available, check an interface licence is available and the driver is installed.

Setting up the Driver

To set up the driver, follow these steps:

- → Navigate to the **Carel Setup** object (Mc). For example, if you started interface 1 with the driver earlier, then the object reference will be 'M1'
- → Set the **RS232 Com Port** (RS.COM) to the COM port you are connecting to Carel with

Checking Communications

You can check that the interface is communicating by reading the **Comms Established** object (DS). A value of 'Yes' indicates the driver has connected to, and is communicating with, the Carel network.

Object Specifications

Once an interface is started, one or more extra objects become available within the top-level object of the device. As with all North objects, each of these extra objects may contain sub-objects, (and each of these may contain sub-objects, and so on) – the whole object structure being a multi-layer hierarchy. It is possible to navigate around the objects using the ObSys Engineering Software.

Each object is specified below, along with its sub-objects.

Example Object Reference

An example of a reference to an object in the same device: the Carel System (S1) contains Unit 1 (U1), which contains an Analogue (A), which contains a Value (O1). Therefore, the object reference will be 'S1.U1.A.O1'.

An example of a reference to an object in a different device: the IP network object (IP) contains Default Commander object (CDIP), which contains the object above (S1.U1.A.O1) – therefore the complete object reference is 'IP.CDIP.S1.U1.A.O1'.

Device Top-Level Objects

When an interface is started using the Carel driver, the objects below become available within the top-level object of the device. For example, if Interface 1 is started, then the object with references 'M1' and 'S1' become available.

Description	Reference	Type
Carel Setup Set up the Carel driver, started on interface *c* (*c* is the interface number)	M*c*	Fixed Container: On the Commander platform this will be *[CDM v20\Carel v20]* On the Integrator and ObSys platforms this will be *[OSM v20\Carel v20]*
Carel System Access Carel system connected to interface *c* (*c* is the interface number)	S*c*	Variable Container: Typically this will be *[Carel v20]* If Carel Unit Type is configured, this will be a fixed container in the format [Carel v20*Unit Type*], e.g. *[Carel v20\MicroAC]* In Direct Connect mode, this will be *[Carel v20\Unit]*

Carel Driver Setup

Object Type: *[OSM v20\Carel v20]*
Object Type: *[CDM v20\Carel v20]*

The Carel driver contains the following objects:

Description	Reference	Type
RS232 Com Port	RS.COM	Obj\Num; Range: 1…8; Adjustable
Baud Rate Baud rate of the Carel RS485 network. 19200 is recommended.	RS.BR	Obj\Num; Range: 4800…19200; Adjustable
Device Label Label displayed when scanning the system	DL	Obj\Text; Max. 20 characters; Adjustable
Comms Established	DS	Obj\NoYes
Direct Connect Set to Yes when connecting with one device only, to use the broadcast address	DC	Obj\NoYes; Adjustable
Legacy Support Set to Yes when connecting with older equipment: pCO controllers with a BIOS dated before 23/7/97, or ASM2 controllers via an RS232/422 converter. When Legacy Support is enabled do not use addresses 17, 18, 20, 25, 35 or 37	LS	Obj\NoYes; Adjustable
Carel Unit Type Leave blank to enable scanning of the contents by the driver. If a fixed contents file is available, enter the folder name here, e.g. 'MicroAC' or 'MicroC2'	DT	Obj\Text; Max. 20 characters; Adjustable
Rescan Network Set to Yes to force the driver to rescan the Carel network. Use this after adding new controllers to the network or changing an address	RN	Obj\NoYes; Adjustable
Maximum Address Set this object to the highest address on the Carel network. Setting this object avoids the driver scanning the full 207 address range	MA	Obj\Num; Range: 1…207; Adjustable
Units Detected Reports the number of controllers found on the network	UC	Obj\Num; Range: 0…32
CRC Errors Reports the number of corrupted messages received. A high error count may indicate noise on the RS485 network	EC	Obj\Num

Carel System

Object Type: *[Carel v20]*

The Carel System contains a network of up to 32 controllers.

If the Carel network is changed the driver should be told to re-scan the network using the 'Rescan Network' object (RN) found in the Carel Setup object.

Description	Reference	Type
Unit *x* The unit address, *x*, is a number in the range 1…207	U*x*	Typically this will be a variable container: *[Carel v20\Unit]* If Carel Unit Type is configured, this will be a fixed container in the format [Carel v20*Unit Type*], e.g. *[Carel v20\MicroAC]*

Carel Unit

Object Type: *[Carel v20\Unit]*

Each Carel Unit contains a list of analogue, integer and digital type values.

The Carel protocol only sends values that have changed. On starting, the driver scans the Carel network for available controllers and requests all their values. The driver then stores these values within its memory, regularly requesting changed values from each controller.

Description	Reference	Type
Parameters General controller information	P	Fixed Container: *[Carel v20\Para]*
Analogue Values	A	Variable Container: *[Carel v20\Unit\Ana]*
Integer Values	I	Variable Container: *[Carel v20\Unit\Int]*
Digital Values	D	Variable Container: *[Carel v20\Unit\Dig]*

Carel Parameters

Object Type: *[Carel v20\Para]*

The Carel Parameters object contains information about the drivers' communication with a Carel packaged controller:

Description	Reference	Type
Communicating Unit is responding to requests for data	S	Obj\NoYes
Hardware Version	V	Obj\Num
Hardware Description	VL	Obj\Text
Hardware BIOS	B	Obj\ENum: 0…3 Values: 0=unknown, 1=Macroplus, 2=Standard pCO, 3=pCO in pLAN
Analogue Count Number of analogue values available	MA	Obj\Num: 0…207
Integer Count Number of integer values available	MI	Obj\Num: 0…207
Digital Count Number of digital values available	MD	Obj\Num: 0…207

Carel Analogue Values

Object Type: *[Carel v20\Unit\Ana]*

A Carel unit contains the following analogue objects:

Description	Reference	Type
Analogue *x* The analogue number, *x*, is in the range 1…207	O*x*	Obj\Float: -3276.7…3276.7; Adjustable

Carel Integer Values

Object Type: *[Carel v20\Unit\Int]*

A Carel unit contains the following Integer objects:

Description	Reference	Type
Integer *x* The digital number, *x*, is in the range 1…207	O*x*	Obj\Num: -32767…32767; Adjustable

Carel Digital Values

Object Type: *[Carel v20\Unit\Dig]*

A Carel unit contains the following Digital objects:

Description	Reference	Type
Digital *x* The digital number, *x*, is in the range 1…207	O*x*	Obj\OffOn; Adjustable

MicroAC Unit

Object Type: [*Carel v20\MicroAC]*

A Carel ⊠AC fixed function air-conditioning controller contains the following objects:

Description	Reference	Type
Communicating	P.S	Obj\NoYes
Version Description	P.VL	Obj\Text
Analogue Count Number of analogue values available	P.MA	Obj\Num: 0…207
Integer Count Number of integer values available	P.MI	Obj\Num: 0…207
Digital Count Number of digital values available	P.MD	Obj\Num; 0…207
Analogue Values	A	Fixed Container: *[Carel v20\MicroAC\Ana]*
Integer Values	I	Fixed Container: *[Carel v20\MicroAC\Int]*
Digital Values	D	Fixed Container: *[Carel v20\MicroAC\Dig]*

MicroAC Analogue Values

Object Type: *[Carel v20\MicroAC\Ana]*

A MicroAC unit contains the following analogue values:

Description	Reference	Type
Probe B3	O1	Obj\Float
Probe B1	O2	Obj\Float
Probe B2	O3	Obj\Float
Probe B4	O4	Obj\Float
Working Set	O5	Obj\Float
Temp Setpoint (cooling)	O11	Obj\Float; Adjustable; -20…60
Temp Setpoint (heating)	O12	Obj\Float; Adjustable; -20…60
Min Temp Setpoint	O13	Obj\Float; Adjustable; -20…60
Max Temp Setpoint	O14	Obj\Float; Adjustable; -20…60
Cooling Differential	O15	Obj\Float; Adjustable; 0.1…11
Heating Differential	O16	Obj\Float; Adjustable; 0.1…11
Temp Dead Zone	O17	Obj\Float; Adjustable; 0.1…20
Humidity Setpoint (%rH)	O18	Obj\Float; Adjustable; 0…100
Min Hum Setpoint	O19	Obj\Float; Adjustable; 0…100
Max Hum Setpoint	O20	Obj\Float; Adjustable; 0…100
Hum Differential (%rH)	O21	Obj\Float; Adjustable; 0…20
Dehum Differential (%rH)	O22	Obj\Float; Adjustable; 0…20
Humidity Dead Zone	O23	Obj\Float; Adjustable; 0…20
Authority for Compensation	O24	Obj\Float; Adjustable; -2…2
Cooling SP Compensation	O25	Obj\Float; Adjustable; -20…60
Heating SP Compensation	O26	Obj\Float; Adjustable; -20…60
Free Cooling Differential	O27	Obj\Float; Adjustable; 0…30
Lower Supply Temp Limit (Free Cooling)	O28	Obj\Float; Adjustable; -20…30
Low Temp Alarm Delta	O29	Obj\Float; Adjustable; 0…50
High Temp Alarm Delta	O30	Obj\Float; Adjustable; 0…50
Low Hum Alarm Delta	O31	Obj\Float; Adjustable; 0…50
High Hum Alarm Delta	O32	Obj\Float; Adjustable; 0…50
Return-Supply Delta	O33	Obj\Float; Adjustable; 0…20
% Reg Band Min	O34	Obj\Float; Adjustable; 0…100
% Reg Band Max	O35	Obj\Float; Adjustable; 0…100
Probe B3 Minimum	O36	Obj\Float; Adjustable; 0…100
Probe B3 Maximum	O37	Obj\Float; Adjustable; 0…100
Probe B1 Calibration	O38	Obj\Float; Adjustable; -6…6
Probe B2 Calibration	O39	Obj\Float; Adjustable; -6…6
Probe B3 Calibration	O40	Obj\Float; Adjustable; -10…10
Probe B4 Calibration	O41	Obj\Float; Adjustable; -6…6

MicroAC Integer Values

Object Type: *[Carel v20\MicroAC\Int]*

A MicroAC unit contains the following Integer values:

Description	Reference	Type
Cold Valve Open (%)	O1	Obj\Num
Heat Valve Open (%)	O2	Obj\Num
0-10V Output (%)	O3	Obj\Num
1 Phase-cut Output (%)	O4	Obj\Num; Adjustable; 0…30000
Supply Fan Hour Counter	O11	Obj\Num; Adjustable; 0…30000
Filter Hour Counter	O12	Obj\Num; Adjustable; 0…30000
Comp 1 Hour Counter	O13	Obj\Num; Adjustable; 0…30000
Comp 2 Hour Counter	O14	Obj\Num; Adjustable; 0…30000
Supply Fan Hour Threshold	O15	Obj\Num; Adjustable; 0…30000
Filter Hour Threshold	O16	Obj\Num; Adjustable; 0…30000
Comp Hour Threshold	O17	Obj\Num; Adjustable; 0…30000
Machine Model	O18	Obj\Enum; Adjustable; 0…3 Values: 0=ED unit, 1=CE unit, 2=CW unit (C/H), 3=Shelter unit
Cooling Operating Mode	O19	Obj\Enum; Adjustable; 0…4 Values: 0=Comp 1, 1=Comp 2, 2=3-point valve, 3=2 different comp, 4=comp in tandem
Heating Operating Mode	O20	Obj\Enum; Adjustable; 0…4 Values: 0=None, 1=1 element, 2=2 elements, 3=3-point valve, 4=2 different elements
Humidifier Present	O21	Obj\NoYes
3P valve Excursion Time (s)	O22	Obj\Num; Adjustable; 0…600
Temperature Regulation	O23	Obj\Enum Adjustable; 0…1 Values: 0=Prop Only, 1=Prop & Integral
Integration time for PI (s)	O24	Obj\Num; Adjustable; 10…3600
Dehumidification type	O25	Obj\Enum; Adjustable; 0…9 Values: 0=Comp 1, 1=Comp 2, 2=Both Comp, 3=Cooling Ramp, 4=Fan Speed Reduction (FSR), 5=FSR/Comp, 6=FSB/Comp, 7=FSR/Both Comp, 8=FSR/Cool Ramp, 9=None
Probe B2 Function	O26	Obj\Enum; Adjustable; 0…4 Values: 0=Setpoint, 1=Free Cooling, 2=3-point control, 3=PUT3, 4=Condensation
Probe B3 Function	O27	Obj\Enum; Adjustable; 0…1 Values: 0=Humidity, 1=Condensation
Output Y2 Function	O28	Obj\Enum; Adjustable; 0…2 Values: 0=Supply Fan, 1=Cond Fan/Press, 2=Cond Fan/Temp
ID1 Present	O29	Obj\NoYes
Alarm Relay Function	O30	Obj\Enum; Adjustable; 0…3 Values: 0=Off All, 1=On All, 2=Off Serious, 3=On Serious
Hum Relay Function	O31	Obj\Enum; Adjustable; 0…7 Values: 0=On Dehum, 1=Off Dehum, 2=Non-serious Alarm, 3=Rotation, 4=On Hum, 5=Off Hum, 6=Fan 2 On, 7=Fan 2 Off
Alarm ID5 Reset Function	O32	Obj\Enum; Adjustable; 0…6 Values: 0=None, 1=Alm Auto, 2=Alarm Man, 3=Auto, 4=Man, 5=Serious Alm Auto, 6=Serious Alm Man
Machines in Rotation	O33	Obj\Num; Adjustable; 0…6
Unit in Rotation	O34	Obj\Num; Adjustable; 0…6
Rotation Time (hrs)	O35	Obj\Num; Adjustable; 0…250

Description	Reference	Type
Air Probe B2	O36	Obj\Enum; Adjustable; 0…1 Values: 0=None, 1=NTC Carel
Type of Probe B3	O37	Obj\Enum; Adjustable; 0…2 Values: 0=None, 1=0-1v or 0-20mA, 2=4-20 mA
Supply Air Probe B4	O38	Obj\Enum; Adjustable; 0…1 Values: 0=None, 1=NTC Carel
Digital Filter	O39	Obj\Num; Adjustable; 1…15
Input Limit	O40	Obj\Num; Adjustable; 1…15
Keypad Lock	O41	Obj\OffOn; Adjustable
Parameter Set (HL)	O42	Obj\Num; Adjustable; 0…3
Data Displayed	O43	Obj\Enum; Adjustable; 0…2 Values: 0=Probes, 1=Set Points, 2=Day/Time
Buzzer Activation	O44	Obj\Num; Adjustable; 0…15
Reset Alarms (P5)	O45	Obj\Num; Adjustable; 0…5
Unit Address	O46	Obj\Num; Adjustable; 0…200
Unit Baudrate	O47	Obj\Enum; Adjustable; 1…5 Values: 1=1200, 2=2400, 3=4800, 4=9600, 5=19200
User Password	O48	Obj\Num; Adjustable; 0…200
Software Version	O49	Obj\Num
Fan Operation	O50	Obj\Enum; Adjustable; 0…2 Values: 0=Always On, 1=Prop w/Min Speed, 2=Prop w/Cut-off
Min Triac Threshold	O51	Obj\Num; Adjustable; 0…100
Max Triac Threshold	O52	Obj\Num; Adjustable; 0…100
Triac Impulse (ms)	O53	Obj\Num; Adjustable; 0…15
Min Output Value (%)	O54	Obj\Num; Adjustable; 0…100
Max Output Value (%)	O55	Obj\Num; Adjustable; 0…100
Min On Time (s)	O56	Obj\Num; Adjustable; 0…300
Min Off Time (s)	O57	Obj\Num; Adjustable; 0…900
Time between 2 start-ups (s)	O58	Obj\Num; Adjustable; 0…900
On delay between 2 Comp (s)	O59	Obj\Num; Adjustable; 0…300
Off delay between 2 Comp (s)	O60	Obj\Num; Adjustable; 0…300
Comp On Delay (s)	O61	Obj\Num; Adjustable; 0…300
Supply Off Fan Delay (s)	O62	Obj\Num; Adjustable; 0…900
Delay on Start-up (s)	O63	Obj\Num; Adjustable; 0…300
Compressor Rotation	O64	Obj\OffOn; Adjustable
Flow Alarm Delay on Start (s)	O65	Obj\Num; Adjustable; 0…250
Flow Alarm Delay Op (s)	O66	Obj\Num; Adjustable; 0…90
Low Press Alarm Delay (s)	O67	Obj\Num; Adjustable; 0…250
Temp/Hum Alarm Delay (min)	O68	Obj\Num; Adjustable; 0…150
Generic Alarm Delay (s)	O69	Obj\Num; Adjustable; 0…250
Time Band Setting	O70	Obj\Enum; Adjustable; 0…2 Values: 0=Disabled, 1=Min Speed, 2=On/Off
Fan Pick-up Time in Cond (s)	O71	Obj\Num; Adjustable; 0…60

MicroAC Digital Values

Object Type: *[Carel v20\MicroAC\Dig]*

A MicroAC unit contains the following Digital values:

Description	Reference	Type
Alarms Active	O1	Obj\NoYes
Buzzer	O2	Obj\OffOn
EPROM Alarm	O3	Obj\NoYes
Probe B1 Fail	O4	Obj\NoYes
Probe B2 Fail	O5	Obj\NoYes
Probe B3 Fail	O6	Obj\NoYes
Probe B4 Fail	O7	Obj\NoYes
Clock Fail	O8	Obj\NoYes
C1 High Pressure Alarm	O9	Obj\NoYes
C2 High Pressure Alarm	O10	Obj\NoYes
C1 Low Pressure Alarm	O11	Obj\NoYes
C2 High Pressure Alarm	O12	Obj\NoYes
Air Flow Alarm	O13	Obj\NoYes
Dirty Filter Alarm	O14	Obj\NoYes
Heating Elements Alarm	O15	Obj\NoYes
Fan Overload Alarm	O16	Obj\NoYes
Compressor Overload Alarm	O17	Obj\NoYes
High Supply Temp Alarm	O18	Obj\NoYes
Humidifier Alarm	O19	Obj\NoYes
Low Ambient Temp Alarm	O20	Obj\NoYes
High Ambient Temp Alarm	O21	Obj\NoYes
Low Ambient Hum Alarm	O22	Obj\NoYes
High Ambient Hum Alarm	O23	Obj\NoYes
Generic Alarm	O24	Obj\NoYes
Fan Hour Counter Alarm	O25	Obj\NoYes
Filter Hour Counter Alarm	O26	Obj\NoYes
Comp 1 Hour Counter Alarm	O27	Obj\NoYes
Comp 2 Hour Counter Alarm	O28	Obj\NoYes
Low Power during EPROM write	O29	Obj\NoYes
Power Fail	O30	Obj\NoYes
Unit Status	O33	Obj\OffOn
Comp 1 Status	O34	Obj\OffOn
Comp 2 Status	O35	Obj\OffOn
Heater 1 Status	O36	Obj\OffOn
Heater 2 Status	O37	Obj\OffOn
Fan Status	O38	Obj\OffOn
Dehum Status	O39	Obj\OffOn
Clock Board Present	O40	Obj\NoYes
Hum Relay Status	O41	Obj\OffOn
Unit On/Off Switch	O49	Obj\OffOn; Adjustable
Temperature Units	O50	Obj\Enum; Adjustable; 0…1 Values: 0=°C, 1=°F

Driver Versions

Version	Build Date	Details
2.0	1/3/2003	Driver re-design implementing protocol version 3.0s
2.0	4/4/2011	Improved handling of communications when unit does not respond
2.0	20/8/2013	Baud rate set to 19200 on initialization

Next Steps…

If you require help, contact support on 01273 694422 or visit *www.northbt.com/support*

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