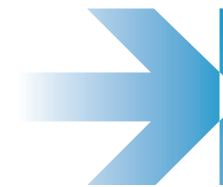
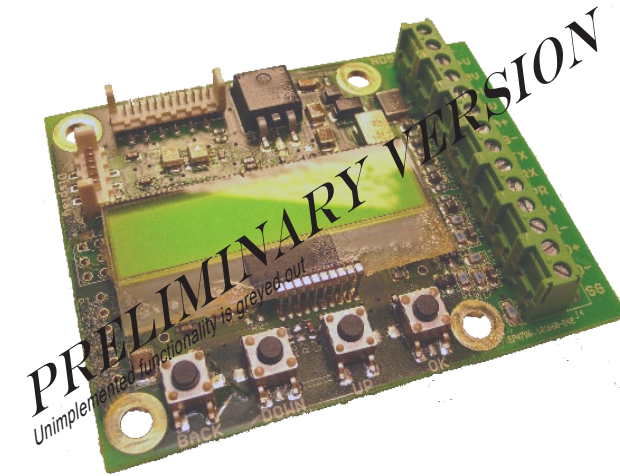


## ND5095 Combi Controller



## user's guide

### QUICK DATA

Size:	85 x 60 mm
Mounting:	50 x 50 mm $\varnothing$ 4.2 x4 holes.
Power Supply:	8 .. 34 V dc max 20mA (without external options)
Grounding:	All mounting holes has R=100k  4,7nF to 0V
Temp. range:	-40 to +70°C (user display is limited to -10°C)
Interface:	RS485, RS232 and isolated 20mA TTY
Communication:	300 to 115200 baud, 7 or 8 databits, NEO parity
Setup method:	On-board MMI or via PC terminal
Backlight:	sourcing max 350 mA (auto fuse) at supplied voltage
Display:	serially clocked data, 5V max 20 mA sink proprietary

Serial async receiver converts various message formats to readable text  
Options include Ethernet, USB and Profibus Interface, A/D, Wireless Radio

This product is tested with our products and will comply to CE requirements in our systems.  
European RoHS is fulfilled.

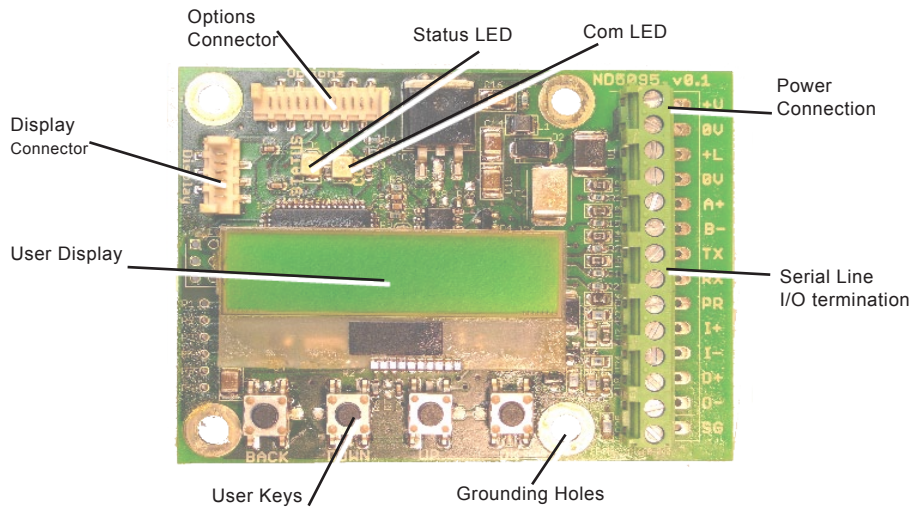
ND2006Nov30



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## POWER & SERIAL LINE CONNECTION

+V :	Power input 24Vdc	TX :	RS-232 TxD (output)
0V :	Power input (return)	RX :	RS-232 RxD (input)
+L :	Output 24Vdc to backlight	PR :	RS-232 Rrogram (input)
0V :	Output 0V to backlight	I+ :	TTY positive input
A+ :	RS-485/422 positive input	I- :	TTY negative input
B- :	RS-485/422 negative input	O+ :	Serial output +
		O- :	Serial output -
		SG :	RS-232 Signal Ground or Shield



When power is applied, the Power LED should blink briefly each second. The Com LED will blink as data is received. The blink rate of the LEDs will vary with communication speed and activity.

To tailor the controller behaviour, various parameters may be set by use of a PC or through the use of the built-in user interface. See separate description for details.

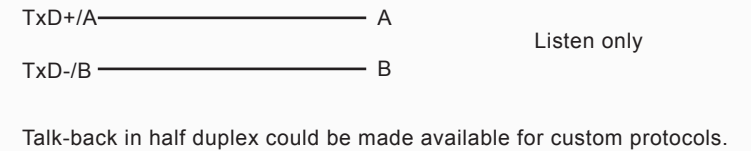
Storing the active setup is done for each parameter set. There are no roll-back for stored values, except for a menu selection to reset all parameters to fabrication defaults.



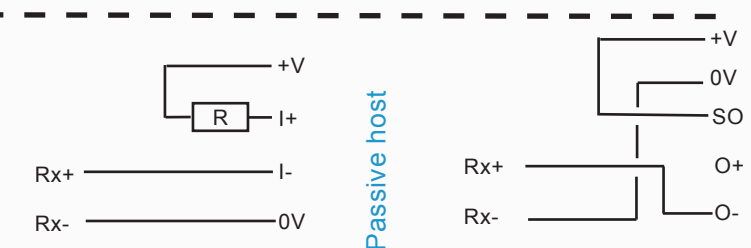
## RS-232 CONNECTION



## RS-422/485 CONNECTION



## TTY 20 mA CONNECTION



R could be 470 Ohm to 1 kOhm depending on supplied voltage

## STANDARD PROTOCOL DESCRIPTION

We have defined a standard protocol to be used where the connected instrument is fully programmable. This message format is known as „Norsk Display Standard Protocol“ and has two operating modes; non-addressed and addressed. These are used throughout the range of different products.

<STX>data<CR> where <STX>=ASCII 02d, <CR>=ASCII 13d  
data includes minus sign (-), decimal point (represented by '.' or ','), leading blanks or zeros.

### Addressing Control

By including a leading string <SOH> AA will select display 'AA' ('00' to '99'). Full message string will be <SOH> AA<STX>data<CR>  
Address '00' will broadcast to all connected displays. Addressing is relatively seldom used.

### PC CONTROL

Parameters are changed through the built-in user interface or through serial programming. To enter serial PC programming, assert the Prog input from a terminal program or the freely available NDConfig Utility.. The display will then respond with informational text, while the Readout will display „Prog“. Only simple configure commands will be accepted at 9600,8,N,1. After programming sequence, communication is set to the selected speed

Available commands are

S [enter]	Status - list all parameter settings
? [enter]	Help - list all available commands
V [enter]	list software number and Version
C=1200 [enter]	set Communication speed 1200-19200
P=N [enter]	set Parity N,E,O
A=01 [enter]	set Address 00-99. (00 means inactive)
PS=02 [enter]	set Protocol Start character (0=not used)
PE=13 [enter]	set Protocol End character
TO=05 [enter]	set TimeOut seconds (0 means not used)
TI=03 [enter]	set Ignore Characters after start
TL=07 [enter]	set Text Length = number of valid characters
RS=send [enter]	set Request String (*A for sending ASCII 01)
SP=02 [enter]	set Sign Byte Position (0 for not used)
SB=02 [enter]	set Sign Bit position in Sign Byte (0 to 8)
FT=kg [enter]	set max 3 character trailing text
BP=5 [enter]	set Control Byte Position (0=not used)
BM=07 [enter]	set Control Byte Bit Mask (0/255=not used)
BB=06 [enter]	set Control Byte Compare Byte
PP=0 [enter]	Particular Protocol (0=normal)
DL=6 [enter]	set Physical Display Length (6=normal)
DJ=R [enter]	set Justification R=Right / L=Left
DP=2 [enter]	set number of Decimals (place fixed dp)

### EXAMPLE

To set the baudrate to 4800, issue the command:  
Cmd[S=Status]>C=4800[Enter]

The PC/terminal will reply with an "OK" if accepted, else "\* ERR".  
Use the „S“-command frequently. The Readout will not start using the parameters before leaving the programming mode and a restart is done.

Programming utilities with predefined setups are available online at <http://www.norskdisplay.com>.

## MAIN FUNCTIONS

Through the menu settings, ND5095 Combi Controller is configured as either Serial Controller, RF Master, RF Slave or A/D Controller. The various modes simplifies the setting of the parameters needed for optimal functionality.

### Serial Controller

Basically this mode handles incoming serial line data. These messages are interpreted and displayed in large format. A host of predefined message formats (called protocols) could be manually selected. A list of protocols is available on the Norsk Display website.  
Data could then be retransmitted either as-is or as a transformed message (ND standard format) through the serial line or over RF (option).

### RF Master

In this mode incoming serial line data is retransmitted as-is on a RF link (option). Being a stand-alone product, it could be used for various applications essentially giving a transparent data link to remote locations. Various frequencies handle the different unlicensed bands, 433MHz broadband selected as the preferred European solution.  
Note that several connections and links could theoretically share the same channel, but the practical solution is to define one network identity and address space per channel to avoid collisions. Channel, NetID and RFaddress must match the other nodes in the RF link.

### RF Slave

Mainly a receiver of RF transmitted messages, this mode is used to retransmit data onto the serial line. In addition, the data received on the RF link could be interpreted and displayed in large format. Channel, NetID and RFaddress must match the other nodes in the RF link.

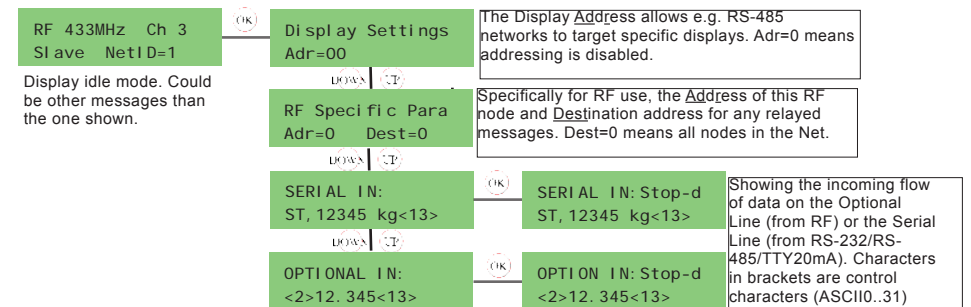
### A/D Converter

An optional converter card may be connected to interface analogue V or mA signals. These signals are converted to digital words and scaled to express real world values. Resulting values could be displayed and transmitted over serial line or RF link (option). Easy scaling adjustments and simple user interface make this a good choice for analog sensors.

## DISPLAY ALTERNATIVES

The built-in user interface will display informative operational parameters for fast feedback of system status. In addition, the two LEDs will indicate proper activity by blinking for serial data activity (COM) and processor health (STATUS).  
Some additional information is available in normal mode (menu system not active). These accessed by using the OK key. To select the specific alternative info, use UP or DOWN keys. To go back to normal display, press BACK or wait for timeout after a few minutes.

Note that when monitoring raw data, you may freeze it by pushing OK. Unlock by pushing OK again.



# MENU SYSTEM -- SETTING PARAMETERS

## Pushbutton Key Usage

**OK** Selects the current menu item OR  
 Advances the cursor one position to the right OR  
 Ends & stores a input sequence when cursor is at the rightmost position

**UP** Advances to the next available menu selection OR  
 Increases the value/character at the cursor position

**DOWN** Presents the previous available menu selection OR  
 Decreases the value/character at the cursor position

**BACK** Takes you back/up one level in the menu hierarchy OR  
 Moves the cursor one position left OR  
 Ends & stores a input value/character when cursor is at the leftmost position

## User Interface (UI)

The small LCD will normally give simple feedback on the status of the system, content depending on the selected function. Clear text information of current set-up or parameter values.

Pressing the OK button when in standard operating mode will reveal additional info.

The preferred method to change operational parameters is the built-in user interface (UI) with a 2 line display and four pushbutton keys. Alternatively, use a terminal program or the free PC/Windows solution from Norsk Display.

Note that optional equipment is registered manually through the UI and this procedure is vital for correct operation of the system. The Factory Settings are password protected (code 5095) to avoid unintended access.

## Entering the Menu System

An hierachial menu system allows the user to alter many operating parameters, effectively defining the behaviuor of the system. Parameters are permanently stored immediately when altered, but will not come into effect before you leave the menu and the Controller resets.

To enter the menu system press the BACK and OK buttons simultanuously, then follow the instructions given on the LCD screen.

## Special Built-in Utilities

These tools are ment as a help during installation and service, giving you valuable fault finding features.

- LED indicators give an rudimentary status report on the controller and ongoing communication
- View current status and settings in clear text format; extended info menu available by pressing OK
- Display raw data received and sent on the serial interface (available through extended info menu)
- Test RF link by monitoring data transfer; all sides of an RF link sends data to verify correct setting and viable ambient conditions (Function is available through the menu system)
- RF verification setting; only allow messages to pass through system if they are repeated. This feature only works for continuously resent data, as it will effectively block messages sent only once. Used in noisy environments

## Test

