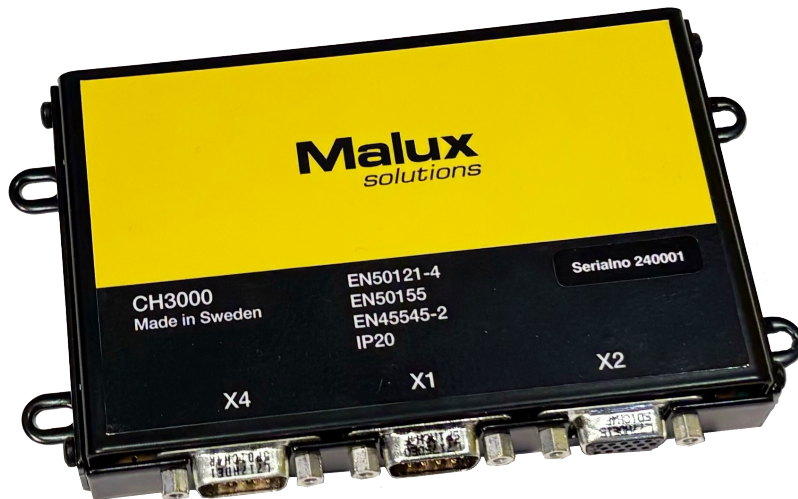


TRAIN TALK™ CH3000 COMMUNICATION & CHARGER UNIT

TECHNICAL MANUAL



TRAINTALK™ CH3000 COMMUNICATION & CHARGER UNIT USER MANUAL

Table of Contents

1	General
1.1	General Description And Purpose Of Use
2	Interfaces
2.1	Signal Direction Conventions
2.2	Cradle Interface X2
2.3	15 pin Power supply and control interface X4
2.4	9 pin Power supply and control interface X1
2.5	Order options
3	Installation
3.1	Mechanical Installation
3.2	Connecting instructions
3.2.1	Cradle Interface
3.2.2	Supply + Control interface with a prefabricated cable
3.2.3	Supply + Control interface with a general purpose cable
3.2.4	Supply input
3.2.5	Voutpout OK relay
3.2.6	On/Off Control input
3.2.7	Phone In Cradle / Call Forward output
3.2.8	RS-422 Interface
4	Technical details
4.1	General
4.2	Dimensions
4.3	Wiring diagrams

1. GENERAL

1.1 GENERAL DESCRIPTION AND PURPOSE OF USE

The Malux Train Talk CH3000 is designed to be used as a RS 422 communication and continuous charging device. It is designed for Malux portable phone cradles, with compatible GSM-R portable phone devices.

The CH3000 unit fulfils EN 61373 / EN50155:2019, EN 50121-3-2:2019, EN 50121-4:2019 and EN 60001-6-4:2019 standards to be compliant for rolling stock applications. The CH3000 unit enables the use of a portable GSM-R phone as a portable phone in 8W Cab radio systems.

The CH3000 unit Unit is equipped with a cradle interface and combined supply and control interface. The control interface consists of "Phone in Cradle" signal, "On/Off Control" signal and an optional "Voutput OK" status signal. There is also a communication interface of type RS-422 allowing direct AT command communication between Cab radio system and portable phone.

The newer CH3000 unit is backward compatible with earlier CH2000 unit. Enhancements and additional features have been added, but it still has the same core features as in CH2000.

2. INTERFACES

2.1 SIGNAL DIRECTION CONVENTIONS

For all digital communication, RX means data directed from cradle to Cab radio and TX means data directed from Cab radio to cradle. For the RS 422 interface, CH3000 is considered as a DCE.

2.2 CRADLE INTERFACE X2

The cradle interface is available in a DSUB HD15 female connector. Supported cradle signals are listed in table below. Signals which are not in active use in charging mode are properly terminated to avoid interference or unwanted functions.

Pin	Signal	Value	Description
1	+12V Power Supply	+ 12V	Supply voltage delivered from CH3000 to cradle
2	Not Connected		
3	Power enable signal		GSM-R phone is in its cradle (holder). TTL level input of CH3000
4	Not Connected		
5	Not Connected		
6	Cradle Enable		Sets cradle (and phone) in enabled mode. 0V/Z output of CH3000
7	Not Connected		
8	RxD (UART)		Input for TTL level asynchronous data
9	Not Connected		
10	Not Connected		
11	0V Power Supply	0 V	Ground reference for cradle interface signals
12	Not Connected		
13	TxD (UART)		Output for TTL level asynchronous data
14	Not Connected		
15	NTC		Temperature sensor for DCDC converter in CH3000

2.3 15-PIN POWER SUPPLY AND CONTROL INTERFACE X4

The Charger Unit power input and control signal interfaces are combined in a DSUB HD15 male connector. Available signals are listed in table below.

Pin	Signal	Value	Description
1	Power+	10-35 Vdc	Input power positive
2	Power-	0V	Input power negative
3	Phone in cradle return	5-35 Vdc / 50 mA	Phone in cradle isolated output
4	On/Off Control+	10-35 Vdc	Phone and cradle enable isolated input
5	Voutput OK	pot.free	Vout OK potential free output
6	Power +	10-35 Vdc	Input power positive
7	Power -	0V	Input power negative
8	Phone in Cradle	5-35 Vdc / 50mA	Phone in cradle isolated output
9	On/Off Control	0V	Ground reference for charge/phone enable isolated input
10	Voutput OK	pot.free	Vout OK potential free output
11	Power-	0V	Input power negative
12	Data out +	5V	RS-422 RX Data out + (Y)
13	Data out -	5V	RS-422 RX Data out (Z)
14	Data in +	5V	RS-422 TX Data in + (A)
15	Data in -	5V	RS-422 TX Data in - (B)

2.4 9-PIN POWER SUPPLY AND CONTROL INTERFACE X1

A subset of the CH3000 unit power input and control signal interfaces is available in a DSUB 9 pin male connector. Available signals are listed in table below.

Pin	Signal	Value	Description
1	Data in +	5V	RS-422 TX Data in + (A)
2	Data in -	5V	RS-422 TX Data in (B)
3	Data out +	5V	RS-422 RX Data out + (Y)
4	Data out -	5V	RS-422 RX Data out (Z)
5	Phone in Cradle	5-35 Vdc / 50 mA	Phone in cradle output
6	Power -	0V	Cab radio ground
7	Power -	0V	Cab radio ground
8	Power + (from Cab)	10-35 Vdc	Cab radio +13V
9	Power + (from Cab)	10-35 Vdc	Cab radio +13V

"Voutput OK" signal enables monitoring of charger status by an external system. However, the signal relay is an option and not equipped in a basic CH3000 unit. Notify in order if relay output is required. Maximum 35 V / 500 mA resistive load. If the signal is used for an inductive load, the latter has to be equipped with a suitable transient protection (R C network, catch diode, varistor etc).

"On/Off Control" (ignition), potential free input, activates the phone and Cradle Enable signal. I.e. this signal must be activated to get the cradle and phone to operate. If the input is not controlled by any external device connected to X4, DSUB HD15, it must be activated internally by fitting a link. On/Off Control+ can be connected to positive input power by fitting a link internally. Input is then activated by shorting On/Off Control - to Power -. Notify in order if On/Off signal is supplied by Power +.

"Phone In Cradle", potential free output indicates that a portable phone is attached into the cradle and it is possible to communicate with this phone to control the Call Forward (Call Transfer) function of an 8 Watt Cab radio system. This output is capable of both source and sink current. Phone In Cradle output supply is available in connector X4, the HD15. The supply for the output can be connected to Power + and source current, by fitting a link internally. By fitting another link the output will sink current. A third link makes it possible to change the logic of the output. Notify in order Phone In Cradle supply and invert link settings. The output is protected against over current. However it shouldn't be connected to external transient protection devices that short the output, such as spark gaps, since they can cause excessive transient currents.

RS-422 is UART type communication port for direct AT command communication between a Cab radio system and portable phone e.g. Request international mobile subscriber identity +CIMI or Subscriber number +CNUM etc.

Note that the support for individual AT commands is phone dependent and should be verified in the phone's documentation.

2.5 ORDER OPTIONS

The CH3000 unit can be tailored to specific needs when ordering. Available options are listed in the table below.

Signal	Function	Selection/Order code
Voutput OK	Relay	Yes / No
On/Off Control input	Potential free	A
	Always active	B
	On/Off Control + connected to power +	C (can be selected with B)
Phone In Cradle output	Potential free	D
	The output supply connected to positive Power +	E (Note: only allowed with C)
	The output supply connected to Power -	F
Phone In Cradle output logic	Output current	Input H / Input L

Normal configuration when using X1, 9 P DSUB connector (Due to limited number of pins in the connector):

Voutput OK, No
On/Off Control input, B and C
Phone In Cradle output, E
Output current, Input H

3. INSTALLATION

3.1 MECHANICAL INSTALLATION

The CH3000 main box, without tabs, measures 85 mm x 135 mm x 22 mm. Weight 465g.

The unit is fixed with four 4 or 5 mm diameter screws on a level surface in a rectangular 50mm x 142 mm pattern.

See 4.2 for detailed fixing dimensions.

3.2 CONNECTING INSTRUCTIONS

3.2.1 Cradle Interface

A Cradle Interface is connected with a prefabricated cable to CH3000 Cradle connector. Tighten connector fixing screws to lock the cable connector on its place.

Supply and Control interface has two options. DSUB HD15 connector (X4) allows for external On/Off Control input and an output for monitoring the power status of CH3000. The DSUB 9 pin connector (X1) has a subset of the signals, intended for direct connection to a Cab radio.

3.2.2 Supply + Control interface with a prefabricated cable

It is possible to order a CH3000 unit with a prefabricated cable which includes a customer specified connector for the master system. In that case there are no additional actions required except to installing the cable between a CH3000 and the master system. The connector on CH3000 side should be locked by tightening the connector fixing screws. Locking on master system side may vary according to specific connect or type. For a minimal wiring example see Figure 4.

3.2.3 Supply + Control interface with a general purpose cable

In general purpose interface cable all fifteen signals are brought out from the supply and control connector. This allows making of different various interface options. Some of these options are shown in Figure 5 and below is a detailed explanation for each signal.

3.2.4 Supply input

Supply voltage is normally connected to pin 1 of the Supply + Control connector, DSUB HD15 (X4). These wires should be externally fuse protected (see 4.1). For supply plus potential pins 1 and 6 are internally connected in parallel. Also for supply minus pins 2, 7 and 11 are short circuited. Parallel connected pins can be used as supply voltage outputs for auxiliary circuits.

DSUB 9 pin connector (X1) supply pins 8 and 9 are intended to be supplied by a 13 V regulated DC supply output from the Cab radio.

3.2.5 Voutput OK relay

The purpose of this output is to provide an ability to monitor the status of internal voltage generated by the CH3000 unit. However, this output is a separately ordered option and is not provided as a standard feature.

Type of the output is a potentially free contact. Contact for internal output voltage status via pins 9 and 10. Contact is closed while status is OK and open while there is a failure in power supply chain.

3.2.6 On/Off Control input

When using DSUB HD15 connector (X4). On/Off Control input directly controls activity state of a phone attached into the cradle. **Note 1. Important:** If the input is not activated, the cradle and phone stays in disabled mode. If this input is not controlled by any external device it should be permanently linked to active state.

The input is a floating opto-isolated input. To control the input on the CH3000 unit, additional supply voltage pin 6, 7 and 11 can be used to provide necessary voltage potentials. Examples of some different connection methods are shown in Figure 5.

When DSUB 9 pin connector (X1) is used, the signal can not be controlled by an external device. In this case internal link X8 will always enable the phone and cradle.

3.2.7 Phone In Cradle / Call Forward output

This output provides information if a phone is attached into the cradle or not. The main usage of the output is to control the Call Forward function of a 8 Watt Cab radio system.

The output is a floating Photocoupler with MOSFET output (type TLP172GM) i.e. it can be connected to a different, external potential. This component can conduct current in both directions.

Figure 5 shows some examples to configure this output for various input types.

3.2.8 RS-422 interface

This is a EIA RS-422 (X.27 ITU T) compatible UART, asynchronous, serial type interface port. The interface can be used for AT command communication between a portable GSM-R phone to control Call Forward function of an 8 Watt Cab radio system.

After detecting an active "Phone in Cradle" signal, the Cab radio and portable phone can communicate with each other.

4. TECHNICAL DETAILS

4.1 GENERAL

Title Description

Power supply	The power supply should be equipped with external 4 A fast blow or 2,5 A slow blow fuses Note: "Cab radio +13V" power input is intended to be protected by Cab radio.
Supply voltage	12 or 24 VDC nom (10...35 VDC, lin 0,25...2,0 A)
Power consumption	Maximum 20 W
Connectors (from left)	DSUB HD15 Male (X4) DSUB 9 Male (X1) DSUB HD15 Female (X2)
Standards	EN 61373 / EN50155:2019, EN 50121-3-2:2019, EN 50121-4:2019 and EN 60001-6-4:2019
Environmental	IEC 61373 category 1 Class A
Digital input (On/Off Control)	Optocoupler input. Note 2
Voltage	10-35 VDC
Current	3 mA typical
Phone in Cradle Output	Photocoupler w. MOSFET output (TLP172GM)
Voltage range	5-35 VDC
Current	50 mA (max recommended)
Series resistance	15 ohm to Power+
Off stage leakage current	<1uA
Saturation voltage	< 0,5V (Iout = 5 mA)
Phone in cradle logic state	1 (MOSFET not conducting) Note 3
Status (Voutput Ok)	Potential free contacts (relay)
Voltage	35 VDC
Current	80 mA
Environmental temperature	
Use	-20...+55 degrees C
Storage	-40...+55 degrees C
IP	IP20
Weight	465g

Note 2: Override "On/Off Control+" by fitting an internal link to set the signal always on (active) to Cradle Enable. Options explained in detail in section 2.4 and 2.5.

Note 3: The logic can be inverted, selected by fitting an internal link. Output can sink current to ground or source current selected by links. Current source is either connector X4 pin 4, "On/Off Control +" or pin 8 and 9, "Power + (from Cab)" selected by link. Options explained in detail in section 2.4 and 2.5.

Note 4: The CH3000 unit can be ordered pre-configured with soldered links. Options explained in detail in section 2.4 and 2.5.

4.2 DIMENSIONS

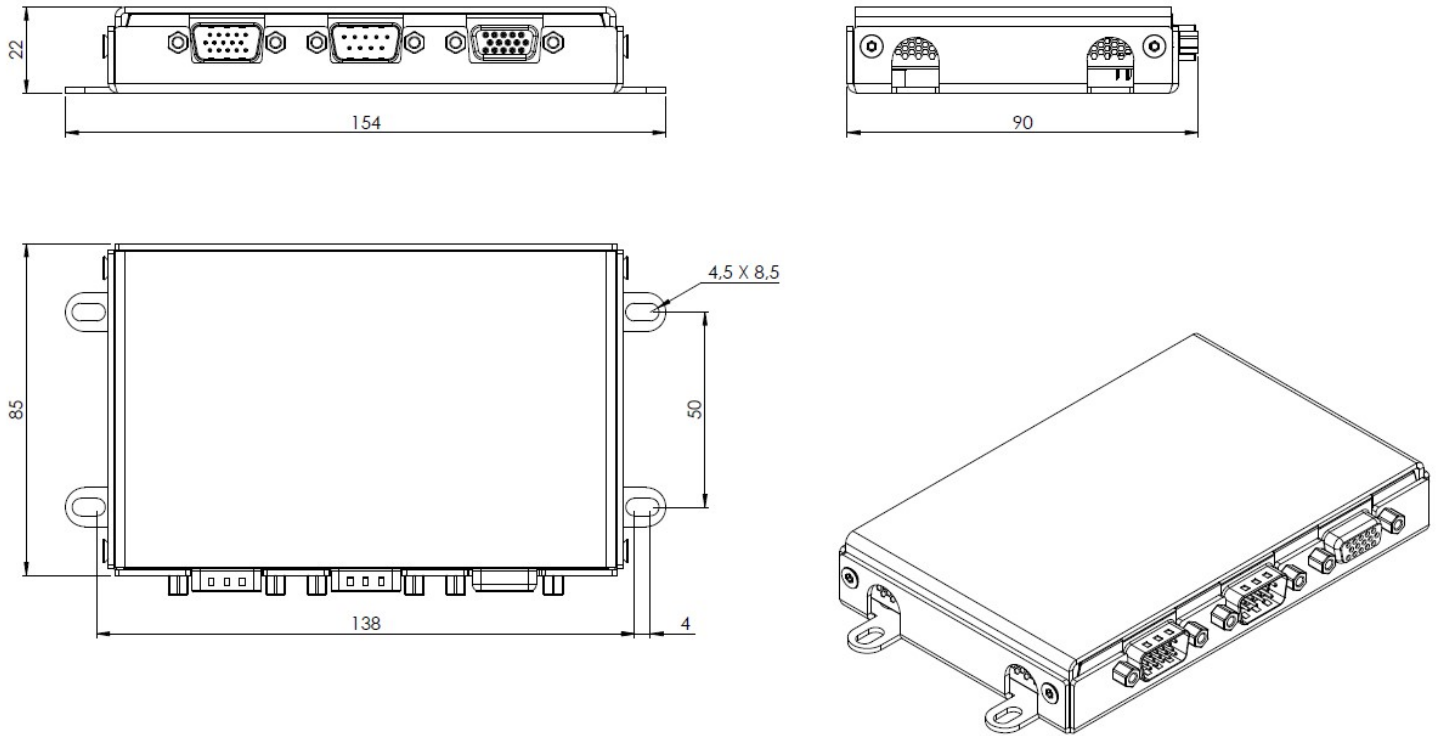


Figure 2 Bottom view, fixing dimensions and outer dimensions

4.3 WIRING DIAGRAMS

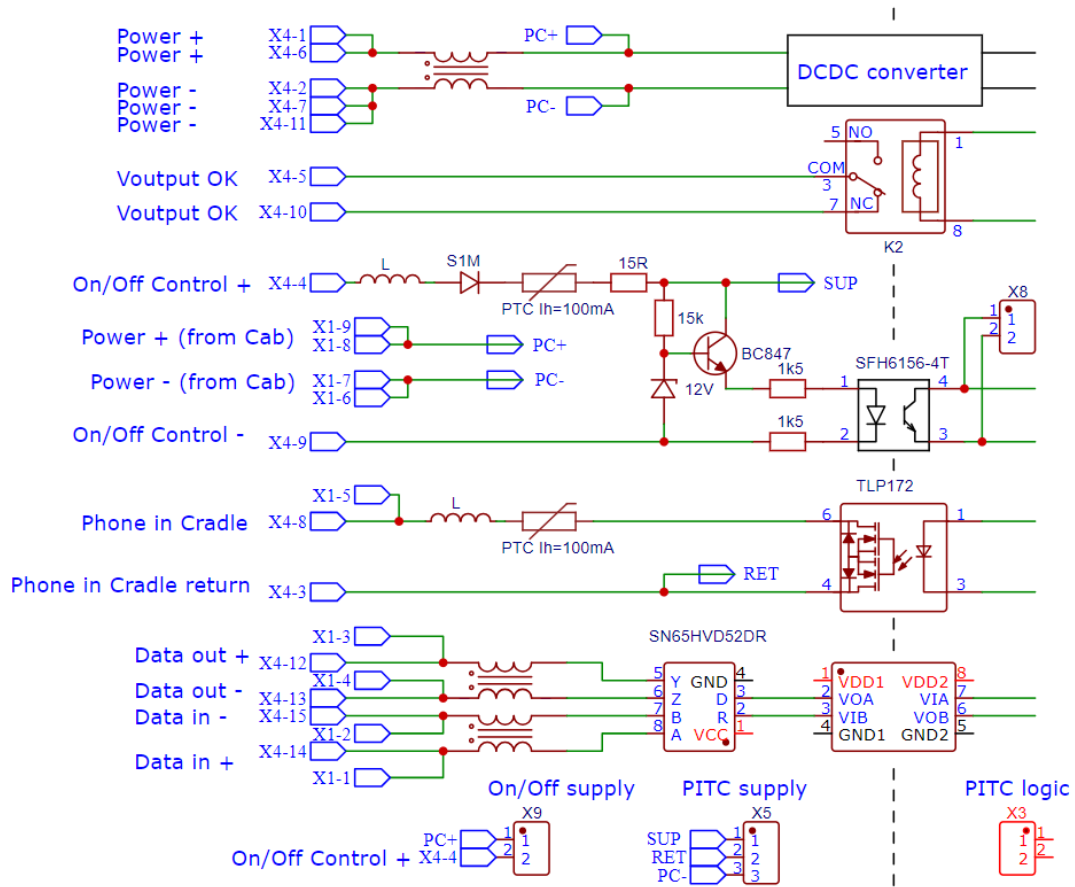


Figure 3: General IO wiring diagram (simplified schematic)

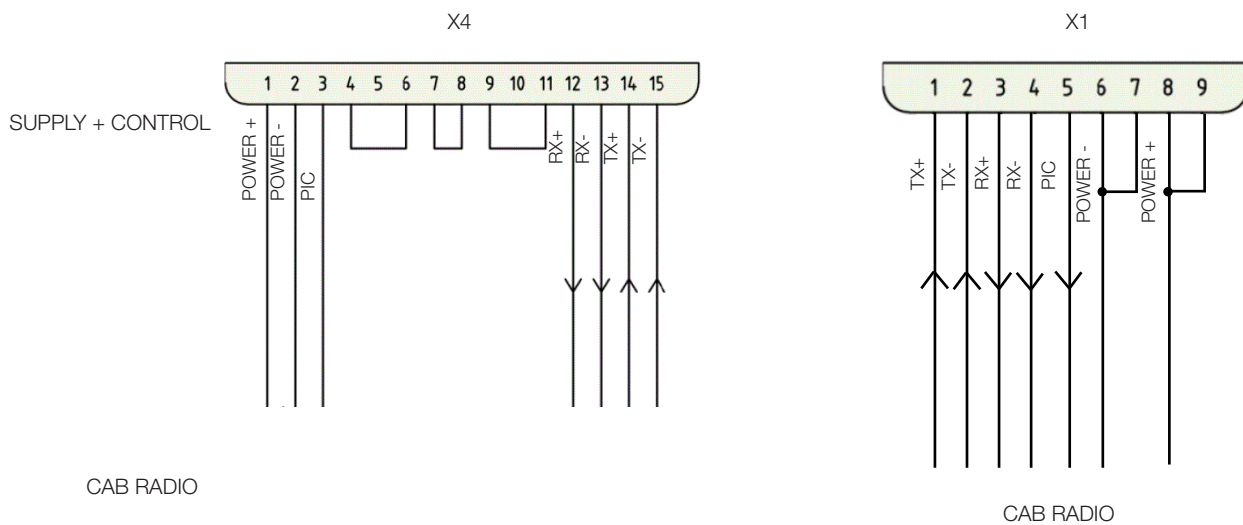


Figure 4: Minimal wiring example (compatible with CH2000 wiring)

4.3 WIRING DIAGRAMS

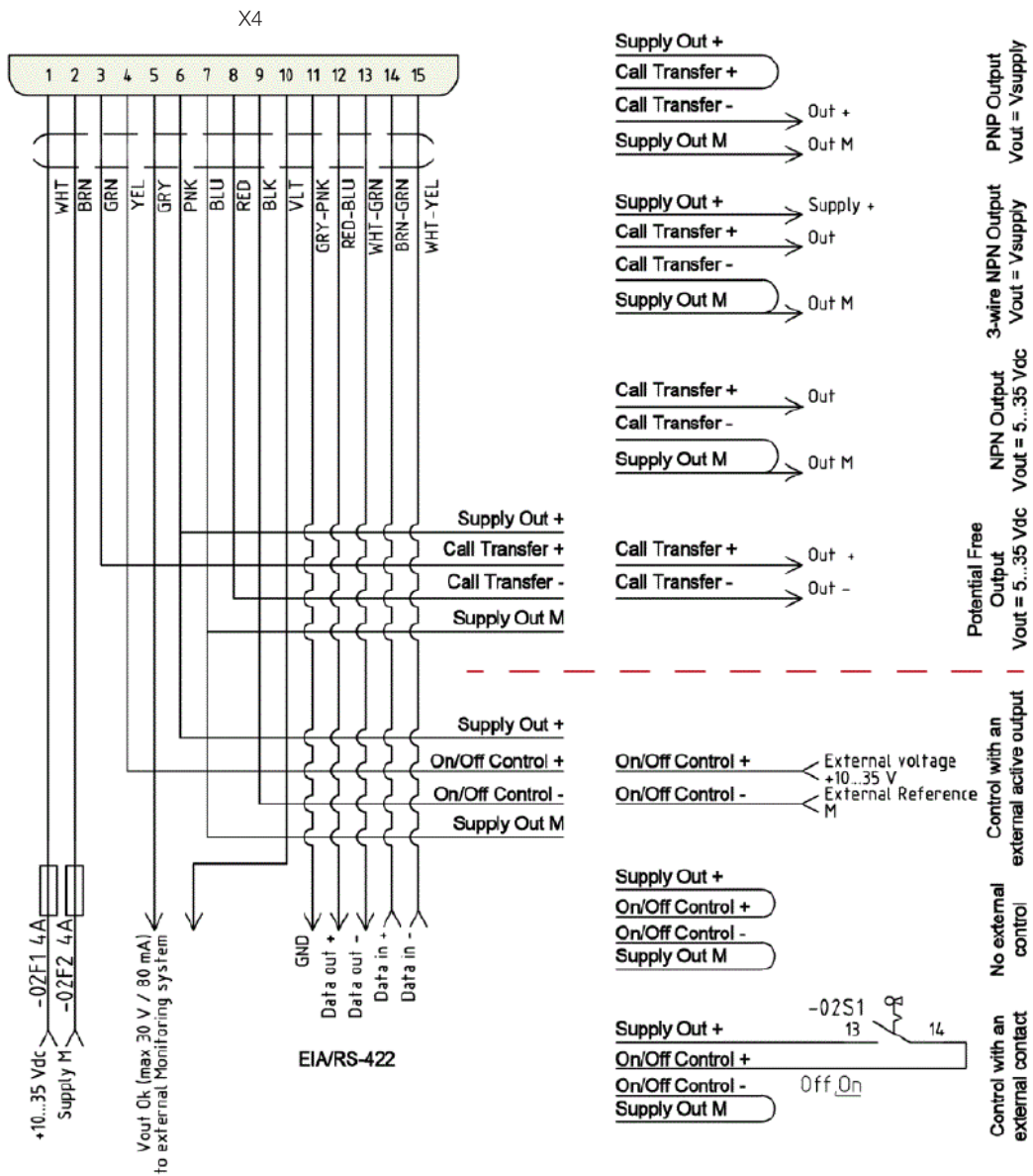


Figure 5 Supply and Control Application Diagrams (compatible with CH 2000 wiring)