

Technical Information

# Joystick

## Prof 1, PVRE and PVRET



## Revision history

*Table of revisions*

| Date          | Changed                                                       | Rev  |
|---------------|---------------------------------------------------------------|------|
| December 2020 | Added clarifying note on page 19                              | 0302 |
|               | Changed document number from 'BC00000069' to 'BC152886484305' | XX   |
| July 2019     | Added Standard and extended versions connections              | 0201 |
| June 2018     | Updated layout to Engineering Tomorrow design                 | 0102 |
| March 2008    | First edition                                                 | 0101 |

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### Prof 1

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## General

## Application

PVRE, PVRET and Prof joysticks from Danfoss are generally used together with PVGs and PVEs, but can be used in any application. A complete range of joysticks from the simple PVRE handle with X-Y functions to the Prof 1 ergonomic handle with rollers and pushbuttons are available.

## Mechanical Design

All handle variants share the same mechanical base to which the electronics are mounted. The mounting flange of the joystick is an integrated part of the mechanical base, which also contains a linkage that transfers handle movement to the electronics. The linkage also includes neutral positioning springs.

The neutral positioning springs are designed to ensure a smooth return of the handle into neutral position. The maximum spring force is optimised to be just strong enough to keep the handle in position, even during operation in rough terrain, without interfering with the operation of the joystick or impairing its ergonomic characteristics.

|              |        |
|--------------|--------|
| Spring force | 8-10 N |
|--------------|--------|

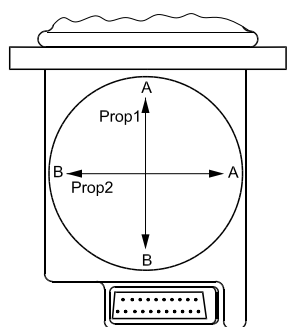
## Main Function Module

(Prop1 and Prop2)

The primary functions of the joystick are defined as its X and Y directions.

Main functions are potentiometers with integrated direction switches.

Each function has a working angle of  $\pm 18^\circ$ .



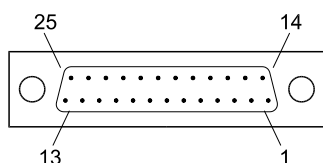
162B89.10

| Signal range      | Neutral signal |
|-------------------|----------------|
| 25% – 75%         | 50%            |
| of supply voltage |                |

When moving the handle diagonally the maximum signal range is not available.

## Connector

All joysticks come with a common **25 pin male SUB-D connector** with M3 screws. (MIL - DTL - 24308)



162B78.11

## General

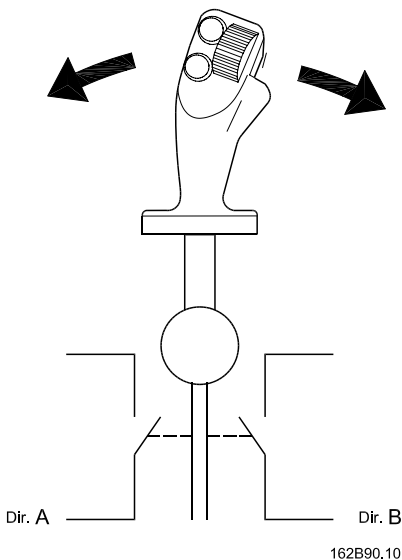
### Direction Switches

Proportional modules have integrated direction switches. One switch is activated when the module is moved in the A direction, the other is activated when the module is moved in the B direction.

The direction switches are used to activate the neutral position switch, and with some electronic modules the direction switch outputs are available in the connector. (See details about electronics.)

There is a dead band in the joystick of approximately 1.5° before the direction switches are activated.

The direction switches are independant from the signal voltage



### Neutral Position Switch

The neutral position switch can supply up to 3 PVEs or other devices (see electrical details), and functions as both a power save and a safety switch.

The switch is only activated when one or more of the proportional modules are activated.

The operation of the neutral position switch is dependant on signals from the direction switches.

Danfoss recommends that the neutral position switch be used to the greatest possible extent.

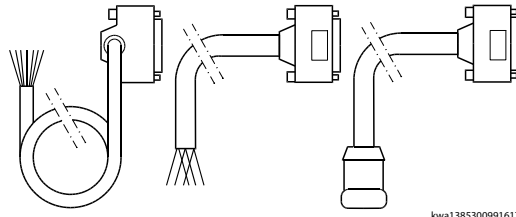
When using the neutral position switch all three UDC wires as well as all three Neutral Switch wires must be connected.

### Cables

For compatibility with different applications, a selection of mating cables are available:

| Code no. 162B.... | Length mm [in] | Plug type | Type               |
|-------------------|----------------|-----------|--------------------|
| 6013              | 4000 [157]     | Leads     | Vertical SUB-D     |
| 6014              | 4000 [157]     | Leads     | Horizontal Sub-D   |
| 6015              | 500 [19]       | Clipper   | –                  |
| 6016              | 230 [9]        | TrimTrio  | –                  |
| 6017              | 230 [9]        | Tabs      | PVRE compatibility |

**General**



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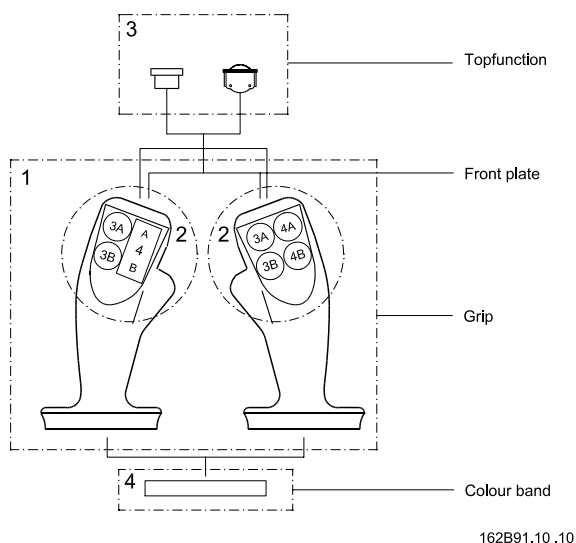
## Prof Joysticks

The Prof family of joysticks is built around a series of modules that can be combined in various ways to create the joystick that best fits the application.

Each joystick has a base module with proportional functions (X & Y); a colour band for decoration and identity, a handle, and depending on handle selection, a number of pushbuttons and/or proportional functions.

### Handle / Top functions

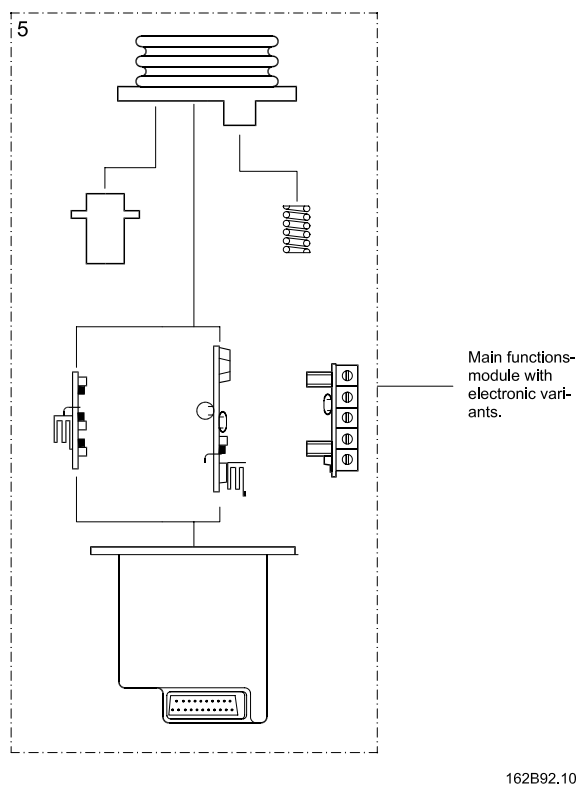
To provide optimum user comfort, a selection of handles is available. Each handle offers a choice of push buttons and / or proportional functions positioned for ease of use and comfort.



### Base module

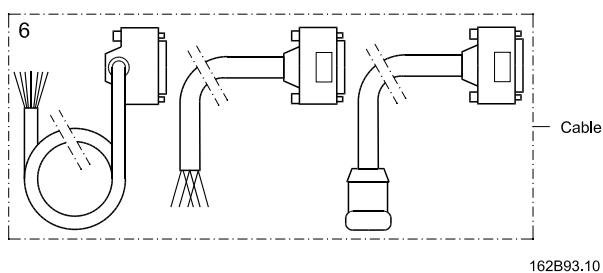
A number of electronic modules provide various performance levels to cater for different needs in different applications.

## Prof Joysticks



## Cable

For easy integration into existing applications cables with different connectors are available as accessories, see page 5.

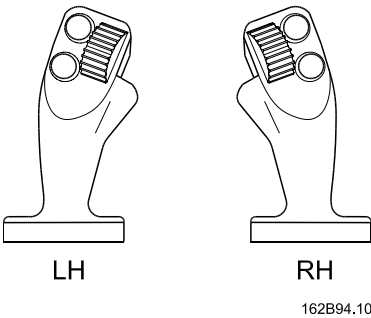


### Prof 1

A professional handle for intensive operation; with a forward-leaning, curved, ergonomic shape. The leather-like grained surface allows the palm of the hand to breathe during operation.

The Prof 1 handle can be fitted with up to seven push buttons, or up to two proportional functions with up to five push buttons.

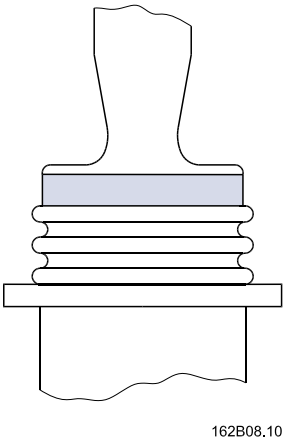
For location and combination of function modules see the overview.



The flush alignment between front plate and grip can't be guaranteed, however, an inspection is made to insure there are no air cavities.

### Color Band

A choice of colors is available for the band at the base of the handle.



| Colors |
|--------|
| Yellow |
| Black  |
| Red    |

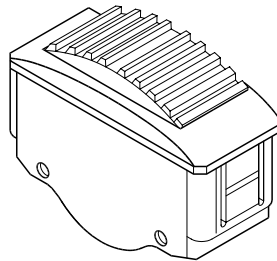
### Proportional Modules

The roller function module is a spring centred potentiometer with integrated direction switches.

Working angle:  $\pm 42^\circ$

Direction switch angle:  $3.5 \pm 2^\circ$

## Prof 1



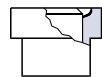
162B62.10

| Signal range      | Neutral signal |
|-------------------|----------------|
| 25% – 75%         | 50%            |
| of supply voltage |                |

## Push Buttons

The handle can be fitted with up to seven independent On/Off functions.

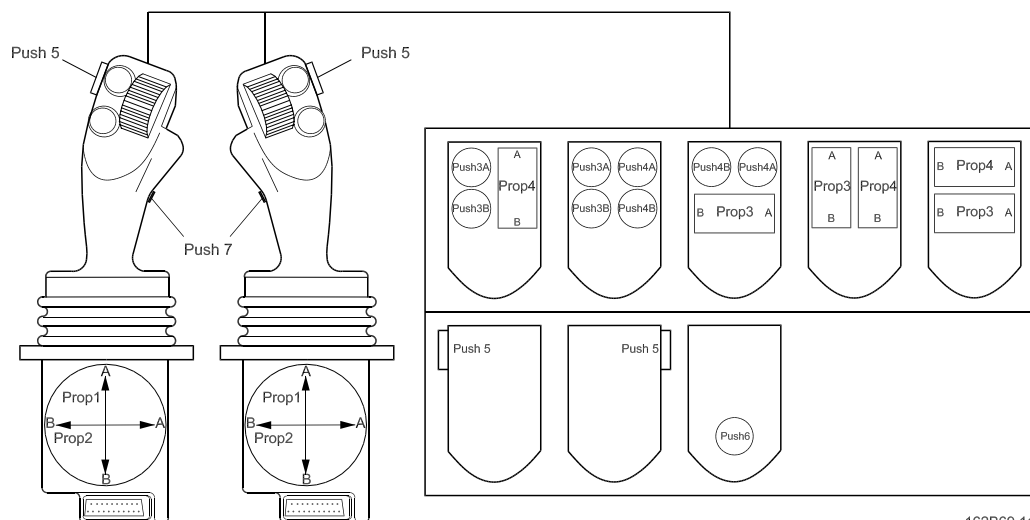
The buttons are protected against shocks and unintentional activation by a high collar.



162B52.10

| Colors |
|--------|
| Yellow |
| Black  |
| Red    |
| Grey   |

## Location and Orientation of Modules



162B69.11

## Prof 1

### Electronic Modules

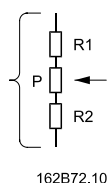
The electronic modules are available with four different performance levels: Basic, Standard, Extended, and CAN-enabled.

#### Basic

The Basic level module is a connection platform that contains no electronics. This version offers raw signals from function modules, proportional modules, and push buttons.

The Basic level module contains no kind of protection, amplification, neutral switches, relays, or filtering and meets no legal specifications.

The proportional functions in the basic module are configured like this:



The value of P is 5 K $\Omega$ , R1 and R2 are 1.125 K $\Omega$  (See technical data for tolerances).

This configuration ensures that the output signal will be at least 25%-75% of the supply voltage.

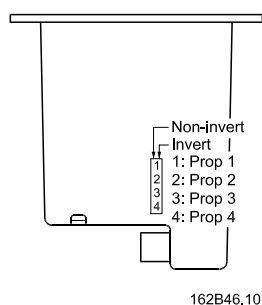
Because of the output impedance of the sensors, it is recommended to use an amplifier if the application draws more than 15  $\mu$ A.

#### Standard

The Standard level electronic module provides amplifiers, inverting and signal relays on all proportional outputs, and an electronic switch on all On/Off outputs.

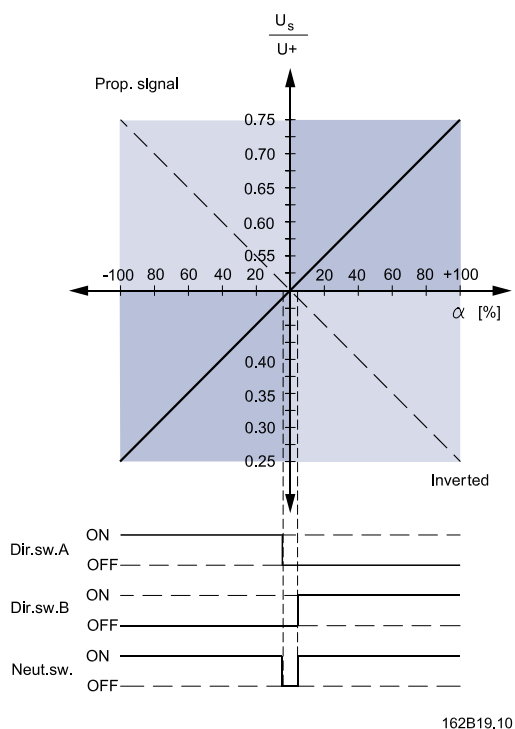
The signal relays are controlled by the power supply in such a way that a power failure will disconnect the output. (This will automatically send a Danfoss proportional valve to neutral position)

When used together with a Danfoss proportional valve signal inversion causes the joystick to move the spool in the direction opposite to the default. This is equivalent to swapping the hoses on the valve outlets.



The directional switches are not affected by the signal inversion.

## Prof 1

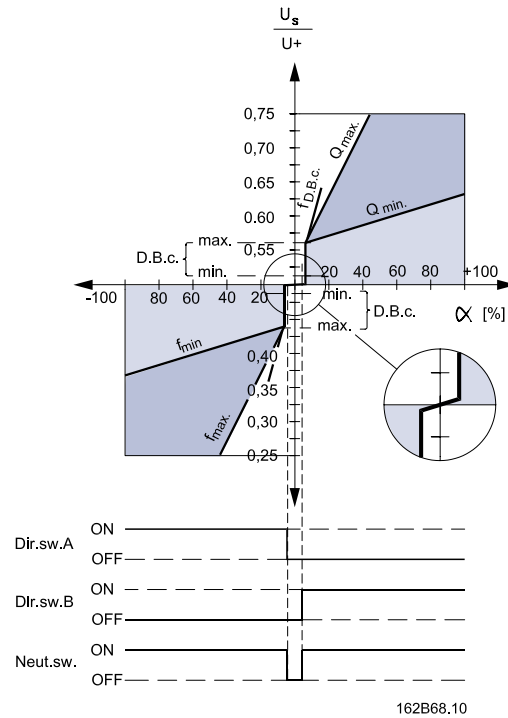


Factory setting: Non-inverted

### Extended

The Extended level electronic module has the same configuration as the Standard level module. Additionally it has adjustable proportional functions. The Extended level module offers the option of individual signal adaptation (flow adjustment) and common dead-band compensation.

**Prof 1**



The dead band compensation (D.B.c.) ensures that the dead band of the valve is reduced to a minimum movement of the grip.

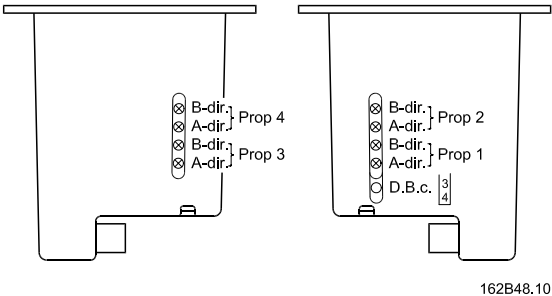
The dead band compensation is only active outside the neutral range, which ensures normal amplification within the neutral position range.

The dead band compensation is set for all four proportional functions on one potentiometer.

For each proportional function there are two integrated potentiometers that independently control the gain for the A and B directions of the signal output without limiting the movement range of the handle (adjustable flow range).

The gain of each function can be adjusted from 0.25 to 2.00. This has no effect within the D.B.c. range.

Location of potentiometers for adjusting D.B.c and gain:



| Factory setting @ 12 V |        |
|------------------------|--------|
| Dead band compensation | 0.42 V |
| Signal gain            | 0.86   |

## **Prof 1**

### **CAN-enabled**

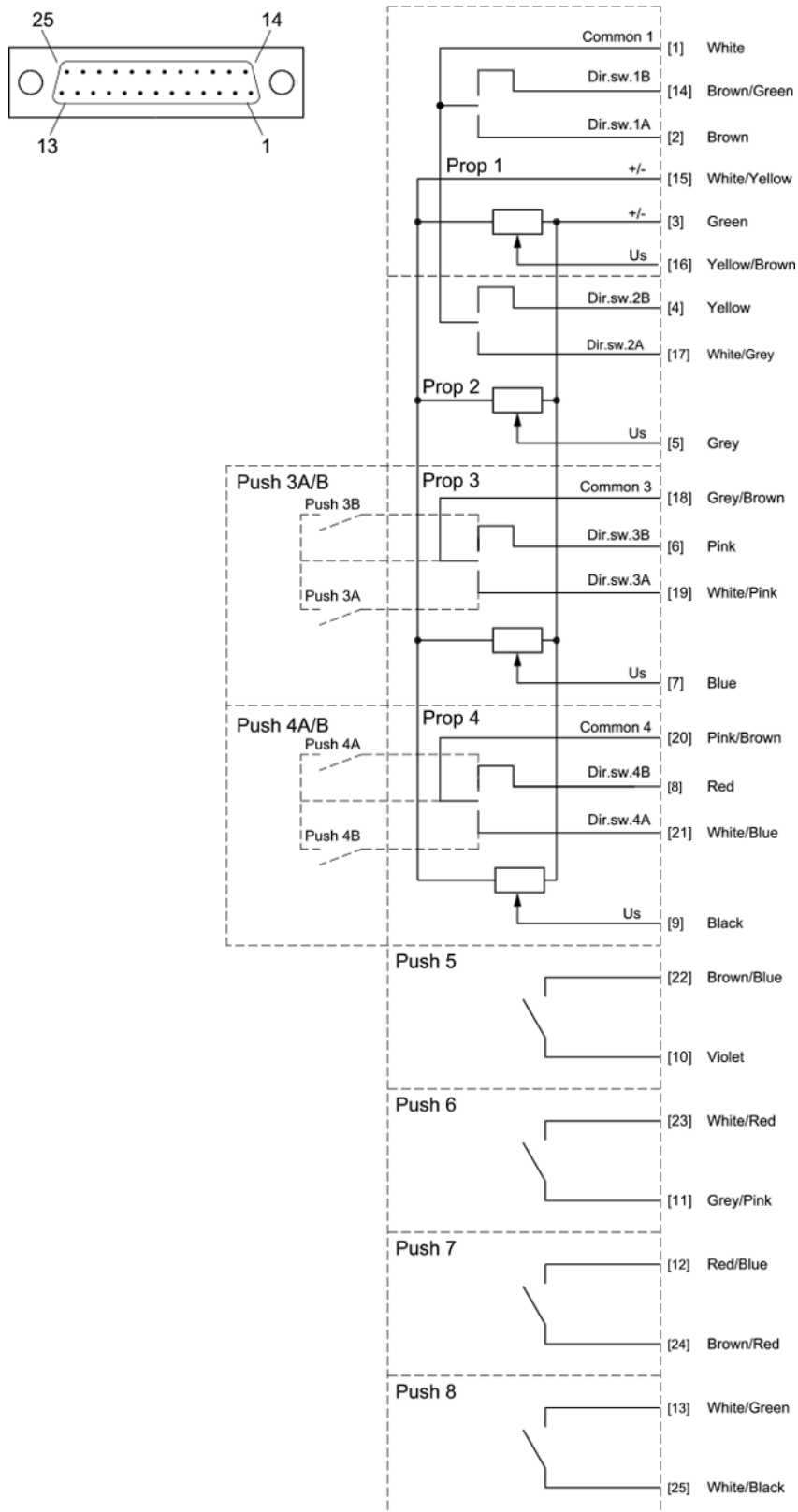
There is a CAN-enabled electronic module available for the Prof family of joysticks. The module provides a standard CANOpen interface. For further information read Danfoss Technote on CAN bus components and see our webpage:

<http://www.Danfoss.com>

## Prof 1

### Basic version connections

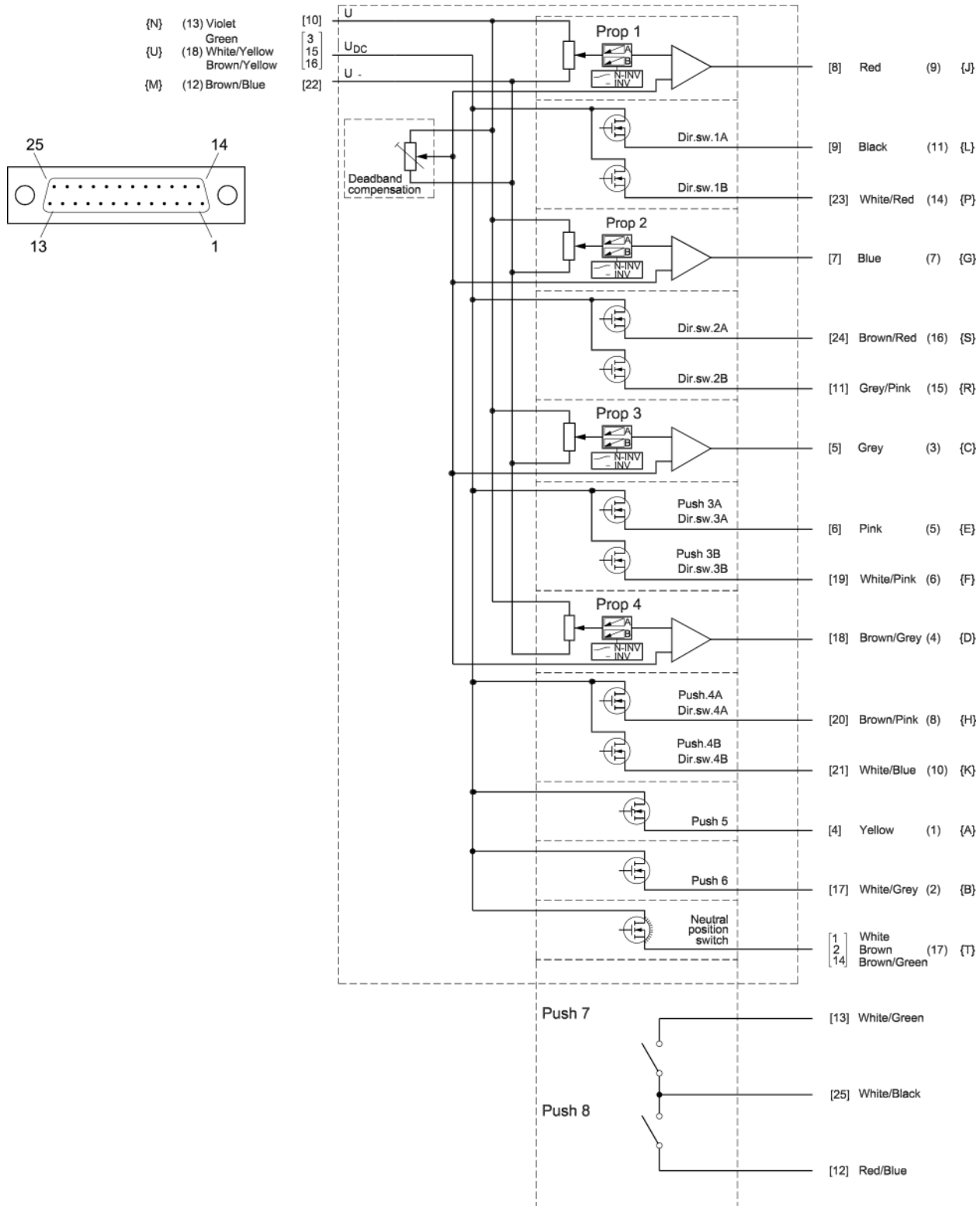
Numbers in [ ] indicate pin number in sub-D connector



## Prof 1

### Standard and extended versions connections

Numbers in [ ] indicate pin number in sub-D connector.



# Technical Information

## Prof 1, PVRE and PVRET Joystick

### Prof 1

#### Technical Data

##### All

|                      |  |              |                           |
|----------------------|--|--------------|---------------------------|
| Enclosure            |  | Below flange | IP 21                     |
|                      |  | Above flange | IP 50                     |
| Ambient temperature  |  |              | -30 - +60° [-22 - +140°F] |
| Max. force on handle |  |              | 1000 N static             |

##### Basic

|                                                              |  |         |                          |
|--------------------------------------------------------------|--|---------|--------------------------|
| Supply voltages                                              |  | U+      | ≤30 V                    |
| Proportional functions                                       |  | P       | 5 KΩ ±50%                |
|                                                              |  | R1 & R2 | $P \times 0.225 \pm 1\%$ |
| Max signal current                                           |  |         | 15 μA (1 mA peak)        |
| Max direction switch load for all proportional functions     |  |         | 30 VDC / 2mA             |
| Max push button load                                         |  |         | 30 VDC / 50mA            |
| There are no electronics built in to the Basic level module. |  |         |                          |

##### Standard and Extended

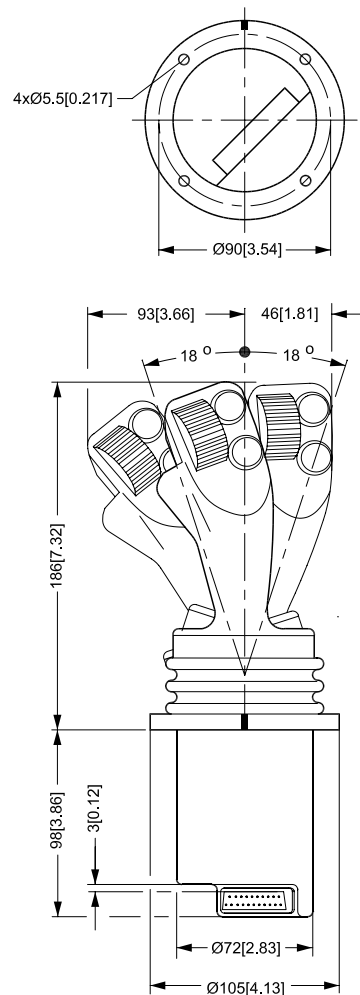
|                                                                     |                          |                                                                                         |                                         |
|---------------------------------------------------------------------|--------------------------|-----------------------------------------------------------------------------------------|-----------------------------------------|
| Supply voltages                                                     |                          | U <sub>DC</sub> , U <sub>+</sub>                                                        | 10-30 V                                 |
|                                                                     |                          | Max ripple                                                                              | 5%                                      |
| Current consumption                                                 |                          |                                                                                         | ≈150 mA                                 |
| Signal voltage U <sub>s</sub>                                       | U <sub>s</sub>           | Min → Max                                                                               | 0.25 → 0.75                             |
|                                                                     | U <sub>+</sub>           | Neutral position                                                                        | 0.50                                    |
| Signal load in neutral position                                     | Load type                | PVE                                                                                     | Other                                   |
|                                                                     | Load impedance           | >6 kΩ                                                                                   | >15 kΩ                                  |
| Signal current at max movement                                      | @ U <sub>DC</sub> = 12 V | U <sub>s</sub> - 0.5 × U <sub>+</sub> + 6 kΩ<br>± 0.6 mA                                | U <sub>s</sub><br>15 kΩ<br>0.2 → 0.6 mA |
|                                                                     | @ U <sub>DC</sub> = 24 V | ± 1.2 mA                                                                                | 0.4 → 1.2 mA                            |
| Signal current in neutral position                                  | @ U <sub>DC</sub> = 12 V | ± 0 mA                                                                                  | 0.4 mA                                  |
|                                                                     | @ U <sub>DC</sub> = 24 V | ± 0 mA                                                                                  | 0.8 mA                                  |
| Inverter                                                            | Non inverted             | Output signal = U <sub>s</sub>                                                          |                                         |
|                                                                     | Inverted                 | Output signal =<br>-1 × (U <sub>s</sub> - 0.5 × U <sub>+</sub> ) + 0.5 × U <sub>+</sub> |                                         |
| Push buttons and directions switches for all proportional functions | Max load                 | 0.6 A                                                                                   |                                         |
| Push 7 & Push 8                                                     | Max load                 | 30 V <sub>DC</sub> / 50 mA                                                              |                                         |
| Neutral position switch                                             | Max load                 | 3 A                                                                                     |                                         |

## Prof 1

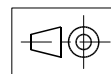
### Extended only

|                         |       |            |                                 |
|-------------------------|-------|------------|---------------------------------|
| Signal regulation $U_s$ | $U_s$ | Min (50%)  | 0.37 → 0.63<br>at 100% movement |
|                         | $U_+$ | Max (200%) | 0.25 → 0.75<br>at 50% movement  |
| Dead band compensation  | $U_s$ | Min        | 0.00                            |
|                         | $U_+$ | Max        | 0.06                            |

### Prof1 dimensions



Prof 1

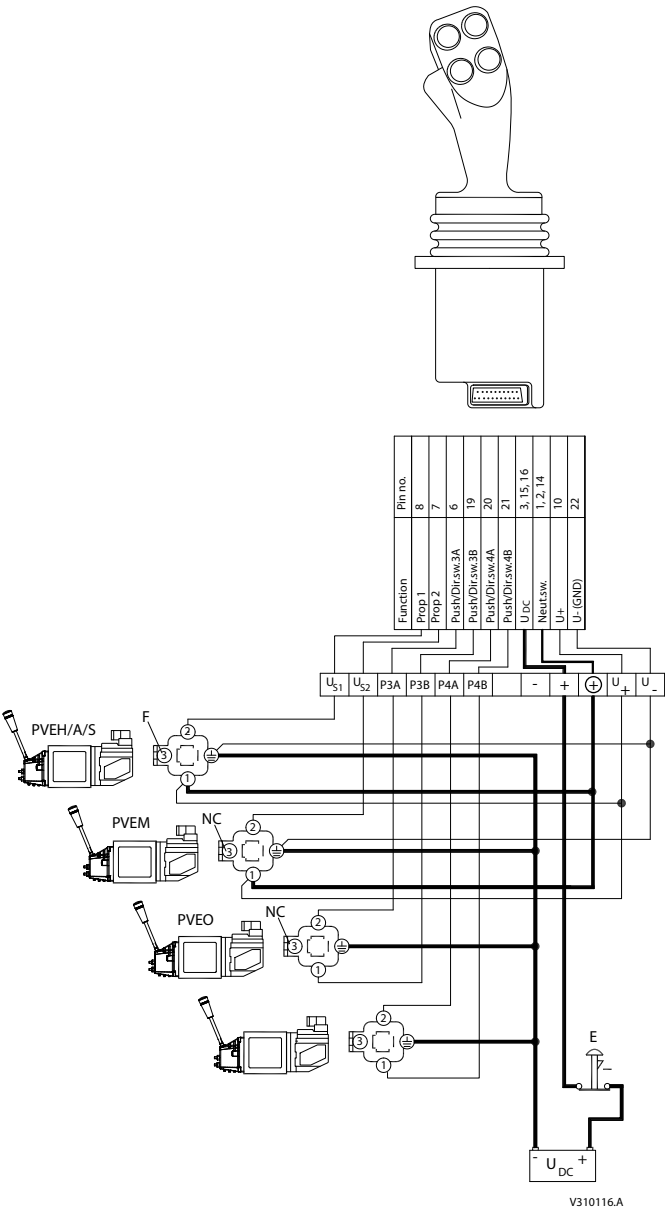


162B129,10

## Prof 1

### Examples of Use

Signal leads must not also function as supply leads unless the distance between PVE and terminal board is less than 3 m [120 in] and the lead cross-section is  $\geq 0.75 \text{ mm}^2$  [AWG 18].



E : Emergency stop

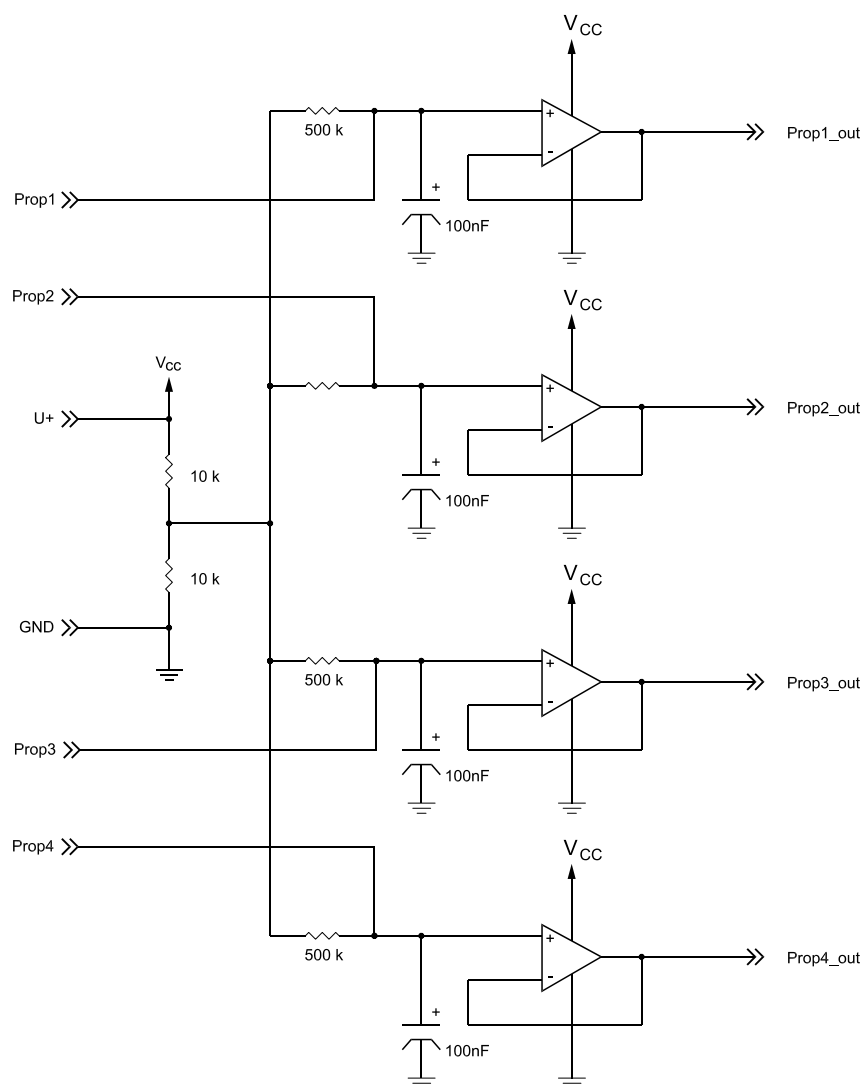
: Signal leads

: Supply leads

### Basic version used with controller

When using the Basic level module with a controller, it is recommend to use a filter similar to the one in the figure below to ensure a symmetric and limited load on the proportional sensors.

## Prof 1



162B97.10

There are no electronics built in to the Basic level module

## Standard program

The joystick variants offer a wide range of different combination possibilities. This may result in several code numbers with identical functions (such as location of push button and choice of color).

Based on experience we have therefore put together a standard program.

The standard program of joysticks is available in the following variants:

- 4-way mechanical
- Yellow push buttons with flat collar
- Red color bands
- Standard electronics (excluding basic and extended with flow and dead band compensation).

Technical Information  
**Prof 1, PVRE and PVRET Joystick**

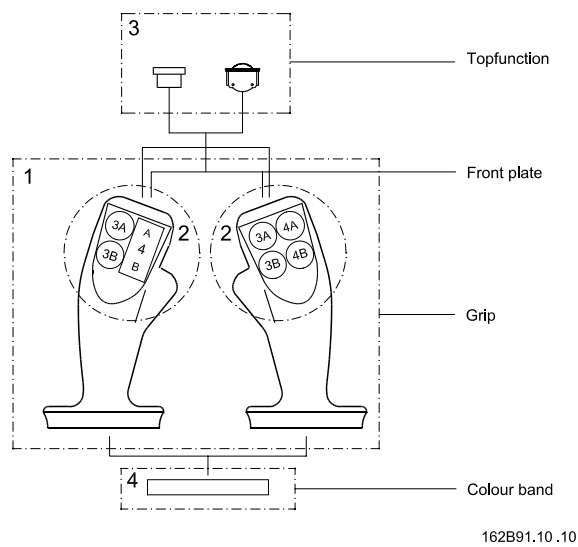
**Prof 1**

| Prop number | ON/OFF number | Code numbers Left hand |                                                                                                   |                                                                                                     | Code numbers Right hand |
|-------------|---------------|------------------------|---------------------------------------------------------------------------------------------------|-----------------------------------------------------------------------------------------------------|-------------------------|
| 2           | 0             | 162F1116               | <br>162B98.10    | <br>162B98.10    | 162F1100                |
| 2           | 1             | 162F1117               | <br>162B99.10    | <br>162B100.10   | 162F1101                |
| 2           | 2             | 162F1118               | <br>162B101.10   | <br>162B102.10   | 162F1102                |
| 2           | 3             | 162F1119               | <br>162B103.10   | <br>162B104.10   | 162F1103                |
| 2           | 4             | 162F1120               | <br>162B105.10  | <br>162B105.10  | 162F1104                |
| 2           | 5             | 162F1121               | <br>162B106.10 | <br>162B106.10 | 162F1105                |
| 2           | 6             | 162F1122               | <br>162B107.10 | <br>162B108.10 | 162F1106                |
| 3           | 0             | 162F1134               | <br>162B109.10 | <br>162B110.10 | 162F1132                |
| 3           | 1             | 162F1135               | <br>162B111.10 | <br>162B112.10 | 162F1133                |
| 3           | 2             | 162F1123               | <br>162B113.10 | <br>162B114.10 | 162F1107                |
| 3           | 3             | 162F1124               | <br>162B115.10 | <br>162B116.10 | 162F1108                |
| 3           | 4             | 162F1125               | <br>162B117.10 | <br>162B118.10 | 162F1109                |

**Prof 1**

| Prop number | ON/OFF number | Code numbers Left hand |                                                                                                   |                                                                                                    | Code numbers Right hand |
|-------------|---------------|------------------------|---------------------------------------------------------------------------------------------------|----------------------------------------------------------------------------------------------------|-------------------------|
| 3           | 2             | 162F1126               | <br>162B119.10   | <br>162B119.10    | 162F1110                |
| 3           | 3             | 162F1127               | <br>162B120.10   | <br>162B121.10    | 162F1111                |
| 3           | 4             | 162F1128               | <br>162B122.10   | <br>162B123.10   | 162F1112                |
| 4           | 0             | 162F1129               | <br>162B124.10   | <br>162B124.10    | 162F1113                |
| 4           | 1             | 162F1130               | <br>162B125.10   | <br>162B126.10   | 162F1114                |
| 4           | 2             | 162F1131               | <br>162B127.10 | <br>162B128.10 | 162F1115                |

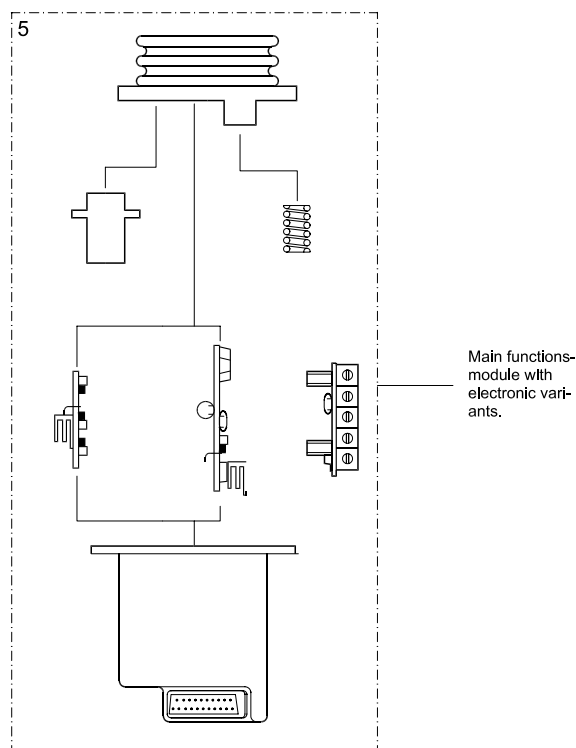
**Selection Overview**



## Prof 1

### 3. Top functions

|                   |        | Position 3A, 3B, 4A, 4B, 5, 6, 7 | Position 3, 4       |
|-------------------|--------|----------------------------------|---------------------|
| Code no. 162B.... |        | Push button                      | Proportional roller |
| Color             | Black  | 3000                             | 3100                |
|                   | Red    | 3002                             | –                   |
|                   | Yellow | 3004                             | –                   |
|                   | Grey   | 3008                             | –                   |



162B92.10

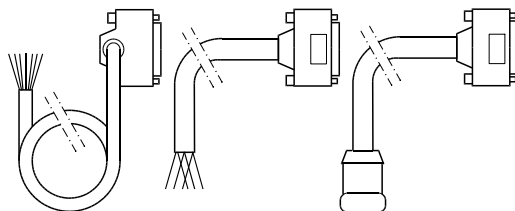
### 1. Grip

| Code no. 162B.... |      |            | Description                                                                |
|-------------------|------|------------|----------------------------------------------------------------------------|
| Black             | Grey |            |                                                                            |
| 1050              | 1000 | Right hand | Without On/Off push button in the side                                     |
|                   | 1001 | Right hand | With On/Off push button in the side (Push 5)                               |
|                   | 1004 | Right hand | With dead mans button (Push 7)                                             |
|                   | 1005 | Right hand | With On/Off push button in the side (Push 5) and dead mans button (Push 7) |
| 1150              | 1100 | Left hand  | Without On/Off push button in the side                                     |
|                   | 1101 | Left hand  | With On/Off push button in the side (Push 5)                               |
|                   | 1104 | Left hand  | With dead mans button (Push 7)                                             |
|                   | 1105 | Left hand  | With On/Off push button in the side (Push 5) and dead mans button (Push 7) |

## Prof 1

### 4. Color band

| Code no. 162B.... | Color  |
|-------------------|--------|
| 4002              | Red    |
| 4003              | Yellow |
| 4000              | Black  |



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### 6. Cable

| Code no. 162B.... | Length [mm] | Plug type | Note               |
|-------------------|-------------|-----------|--------------------|
| 6013              | 4000        | Leads     | Vertical           |
| 6014              | 4000        | Leads     | Horizontal         |
| 6015              | 500         | Clipper   | –                  |
| 6016              | 230         | TrimTrio  | –                  |
| 6017              | 230         | Tabs      | PVRE compatibility |

Technical Information  
**Prof 1, PVRE and PVRET Joystick**

**Prof 1**

**2. Front plates**

| Code no. 162B... Gray & (Black) |             |             |             |             |             |             |             |             |
|---------------------------------|-------------|-------------|-------------|-------------|-------------|-------------|-------------|-------------|
| 2000 (2050)                     | 2010 (2060) | 2001 (2051) | 2009 (2059) | 2011 (2061) | 2017 (2067) | 2020 (2070) | 2002 (2052) | 2007 (2057) |
|                                 |             |             |             |             |             |             |             |             |
| 2013 (2063)                     | 2008 (2058) | 2030 (2080) | 2003 (2053) | 2012 (2062) | 2016 (2066) | 2004 (2054) | 2005 (2055) | 2100 (2150) |
|                                 |             |             |             |             |             |             |             |             |
| 2112 (2162)                     | 2102 (2152) | 2103 (2153) | 2101 (2151) | 2107 (2157) | 2121 (2171) | 2120 (2170) | 2130 (2180) | 2109 (2159) |
|                                 |             |             |             |             |             |             |             |             |
| 2108 (2158)                     | 2127 (2177) | 2137 (2187) | 2200 (2250) | 2210 (2260) | 2209 (2259) | 2208 (2258) | 2138 (2188) |             |
|                                 |             |             |             |             |             |             |             |             |

162B56.11

**5. Electronics**

| Code no. 162B.... | Type        | Description                                                                                                                                                                        |
|-------------------|-------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| 5000              | Basic       | 2 - 4 proportional functions, 0 - 7 ON / OFF functions                                                                                                                             |
| 5002              | Standard    | 2 - 4 proportional functions with direction switch and neutral switch 0 - 7 ON / OFF functions                                                                                     |
| 5004              | Extended    | 2 - 4 proportional functions with direction switch and neutral switch Electronic flow adjustment and dead band compensation on one or more prop functions 0 - 7 ON / OFF functions |
| 5100              | CAN enabled | See CAN Tech-Note                                                                                                                                                                  |

**Prof 1**
**Standard program details**

This table shows a breakdown of contents of the standard program joysticks.

| Code numbers | Front plate | Grip code | Electronic |
|--------------|-------------|-----------|------------|
| 162F1100     | 162B2000    | 162B1000  | 162B5002   |
| 12F1101      | 162B2010    | 162B1000  | 162B5002   |
| 12F1102      | 162B2020    | 162B1000  | 162B5002   |
| 162F1103     | 162B2030    | 162B1000  | 162B5002   |
| 162F1104     | 162B2004    | 162B1000  | 162B5002   |
| 162F1105     | 162B2005    | 162B1000  | 162B5002   |
| 162F1106     | 162B2005    | 162B1001  | 162B5002   |
| 162F1107     | 162B2102    | 162B1000  | 162B5002   |
| 162F1108     | 162B2103    | 162B1000  | 162B5002   |
| 162F1109     | 162B2103    | 162B1001  | 162B5002   |
| 162F1110     | 162B2127    | 162B1000  | 162B5002   |
| 162F1111     | 162B2127    | 162B1001  | 162B5002   |
| 162F1112     | 162B2137    | 162B1001  | 162B5002   |
| 162F1113     | 162B2200    | 162B1000  | 162B5002   |
| 162F1114     | 162B2200    | 162B1001  | 162B5002   |
| 162F1115     | 162B2210    | 162B1001  | 162B5002   |
| 162F1116     | 162B2000    | 162B1100  | 162B5002   |
| 162F1117     | 162B2001    | 162B1100  | 162B5002   |
| 162F1118     | 162B2002    | 162B1100  | 162B5002   |
| 162F1119     | 162B2003    | 162B1100  | 162B5002   |
| 162F1120     | 162B2004    | 162B1100  | 162B5002   |
| 162F1121     | 162B2005    | 162B1100  | 162B5002   |
| 162F1122     | 162B2005    | 162B1101  | 162B5002   |
| 162F1123     | 162B2120    | 162B1100  | 162B5002   |
| 162F1124     | 162B2130    | 162B1100  | 162B5002   |
| 162F1125     | 162B2130    | 162B1101  | 162B5002   |
| 162F1126     | 162B2127    | 162B1100  | 162B5002   |
| 162F1127     | 162B2127    | 162B1101  | 162B5002   |
| 162F1128     | 162B2137    | 162B1101  | 162B5002   |
| 162F1129     | 162B2200    | 162B1100  | 162B5002   |
| 162F1130     | 162B2200    | 162B1101  | 162B5002   |
| 162F1131     | 162B2210    | 162B1101  | 162B5002   |
| 162F1132     | 162B2100    | 162B1000  | 162B5002   |
| 162F1133     | 162B2112    | 162B1000  | 162B5002   |
| 162F1134     | 162B2107    | 162B1100  | 162B5002   |
| 162F1135     | 162B2121    | 162B1100  | 162B5002   |

## Prof 1

### Prof 1 Joystick Specification

#### Prof 1 Joystick Specification - Customer specification

|                                                                                                                                                                                                                                                                            |                                                   |                                                                              |
|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|---------------------------------------------------|------------------------------------------------------------------------------|
| Code no:                                                                                                                                                                                                                                                                   |                                                   |                                                                              |
| Customer:                                                                                                                                                                                                                                                                  |                                                   |                                                                              |
| Application:                                                                                                                                                                                                                                                               |                                                   |                                                                              |
| Subsidiary/Dealer:                                                                                                                                                                                                                                                         |                                                   |                                                                              |
| 1. Grip                                                                                                                                                                                                                                                                    |                                                   |                                                                              |
| 2. Front plate                                                                                                                                                                                                                                                             |                                                   |                                                                              |
| 3. Top functions                                                                                                                                                                                                                                                           | Position<br>(push button color)                   | Position<br>(roller)                                                         |
|                                                                                                                                                                                                                                                                            | 3A:                                               | 3:                                                                           |
|                                                                                                                                                                                                                                                                            | 3B:                                               |                                                                              |
|                                                                                                                                                                                                                                                                            | 4A:                                               | 4:                                                                           |
|                                                                                                                                                                                                                                                                            | 4B:                                               |                                                                              |
|                                                                                                                                                                                                                                                                            | 5:                                                |                                                                              |
|                                                                                                                                                                                                                                                                            | 6:                                                |                                                                              |
| 7: <sup>1)</sup>                                                                                                                                                                                                                                                           |                                                   |                                                                              |
| 4. Colour band                                                                                                                                                                                                                                                             |                                                   |                                                                              |
| 5. Main function module                                                                                                                                                                                                                                                    | Set-up                                            |                                                                              |
|                                                                                                                                                                                                                                                                            | Inverted <sup>2)</sup><br>(check mark = Inverted) | Flow reduction and dead-band compensation <sup>3)</sup><br>(check mark = ON) |
|                                                                                                                                                                                                                                                                            | Prop. 1<br>Prop. 2<br>Prop. 3<br>Prop. 4          | Prop. 1<br>Prop. 2<br>Prop. 3<br>Prop. 4                                     |
|                                                                                                                                                                                                                                                                            |                                                   |                                                                              |
| 6. Cable                                                                                                                                                                                                                                                                   |                                                   |                                                                              |
| Compiled by:                                                                                                                                                                                                                                                               | Checked by:                                       |                                                                              |
| Date:                                                                                                                                                                                                                                                                      | Date:                                             |                                                                              |
| <sup>1)</sup> Only for deadman button<br><sup>2)</sup> Only for standard and extended level options. Factory setting is "non-inverted" if nothing else is mentioned<br><sup>3)</sup> Only for extended level option. Factory setting is "on" if nothing else is mentioned. |                                                   |                                                                              |

## PVRE series 2

The PVRE series 2 is the successor to the popular PVRE joystick. This joystick builds on the known technology from the Prof family of joysticks as well as the well known handles from the PVRE series 1 joysticks.

## Versions

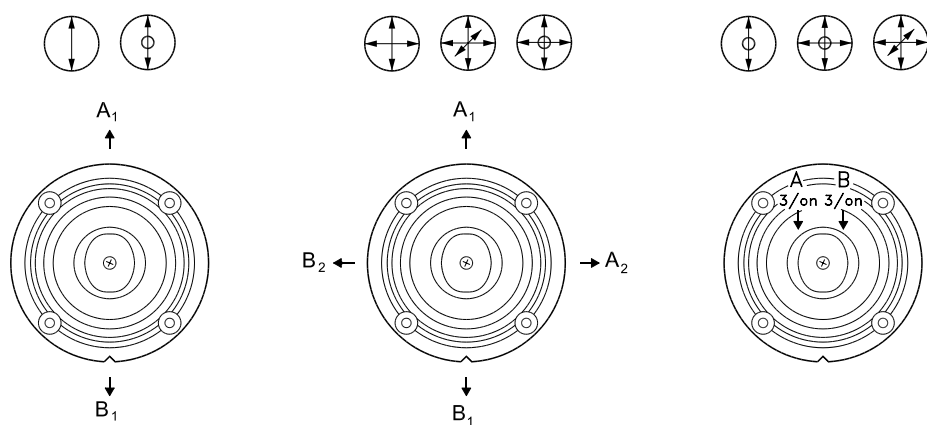
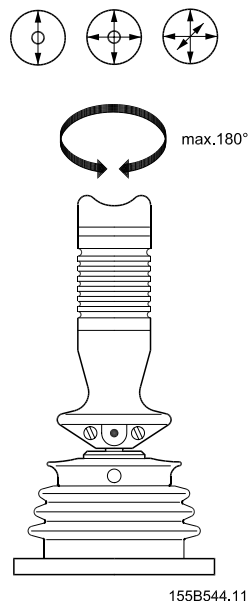
The PVRE handle is available in three different variants: No top function, with prop 3, and with two On/Off functions (rocker switches).

| Code no.<br>162F....                                                         | 1310<br>(1300)                                                                                 | 1311<br>(1301)                                                                                 | 1312<br>(1302)                                                                                 | 1313<br>(1303)                                                                                   | 1314<br>(1304)                                                                                    |
|------------------------------------------------------------------------------|------------------------------------------------------------------------------------------------|------------------------------------------------------------------------------------------------|------------------------------------------------------------------------------------------------|--------------------------------------------------------------------------------------------------|---------------------------------------------------------------------------------------------------|
| Symbol                                                                       | <br>155B60.10 | <br>155B62.10 | <br>155B64.10 | <br>155B63.10 | <br>155B147.10 |
| Prop1                                                                        | X                                                                                              | X                                                                                              | X                                                                                              | X                                                                                                | X                                                                                                 |
| Prop 2                                                                       | X                                                                                              | X                                                                                              | –                                                                                              | –                                                                                                | X                                                                                                 |
| Prop 3                                                                       | –                                                                                              | –                                                                                              | –                                                                                              | –                                                                                                | X                                                                                                 |
| On/Off                                                                       | X                                                                                              | –                                                                                              | X                                                                                              | –                                                                                                | –                                                                                                 |
| () Incl. PVRE series 1 adapter ring for mounting in place of a PVRE Series 1 |                                                                                                |                                                                                                |                                                                                                |                                                                                                  |                                                                                                   |

## PVRE series 2

### Location and Orientation of Functions

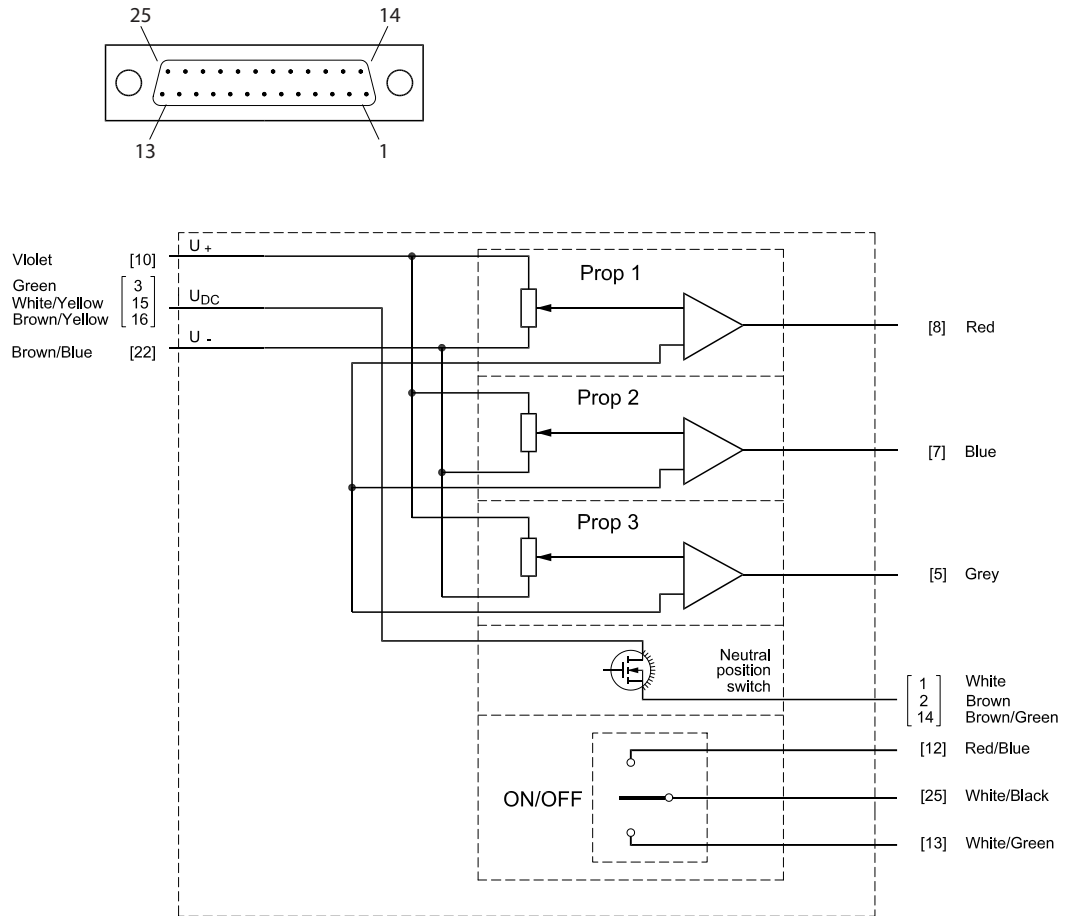
It is possible to turn the PVRE handle through 180° to make the direction of movement fit the application.



## PVRE series 2

### Connections

*PVRE/T version connections*



P200181

Numbers in [ ] indicate pin number in sub-D connector.

### Technical Data

|                     |                 |                  |                           |
|---------------------|-----------------|------------------|---------------------------|
| Enclosure           |                 | Below flange     | IP 21                     |
|                     |                 | Above flange     | IP 65                     |
|                     |                 | With On/Off      | IP 42                     |
|                     |                 | With Prop 3      | IP 65                     |
| Ambient temperature |                 |                  | −30 - +60° [−22 - +140°F] |
| Supply voltages     |                 | U <sub>DC</sub>  | 10-30 V                   |
|                     |                 | Max ripple       | 5%                        |
| Current consumption |                 |                  | ≈150 mA                   |
| Signal voltage      | U <sub>s</sub>  | Min → Max        | 0.25 → 0.75               |
|                     | U <sub>DC</sub> | Neutral position | 0.50                      |

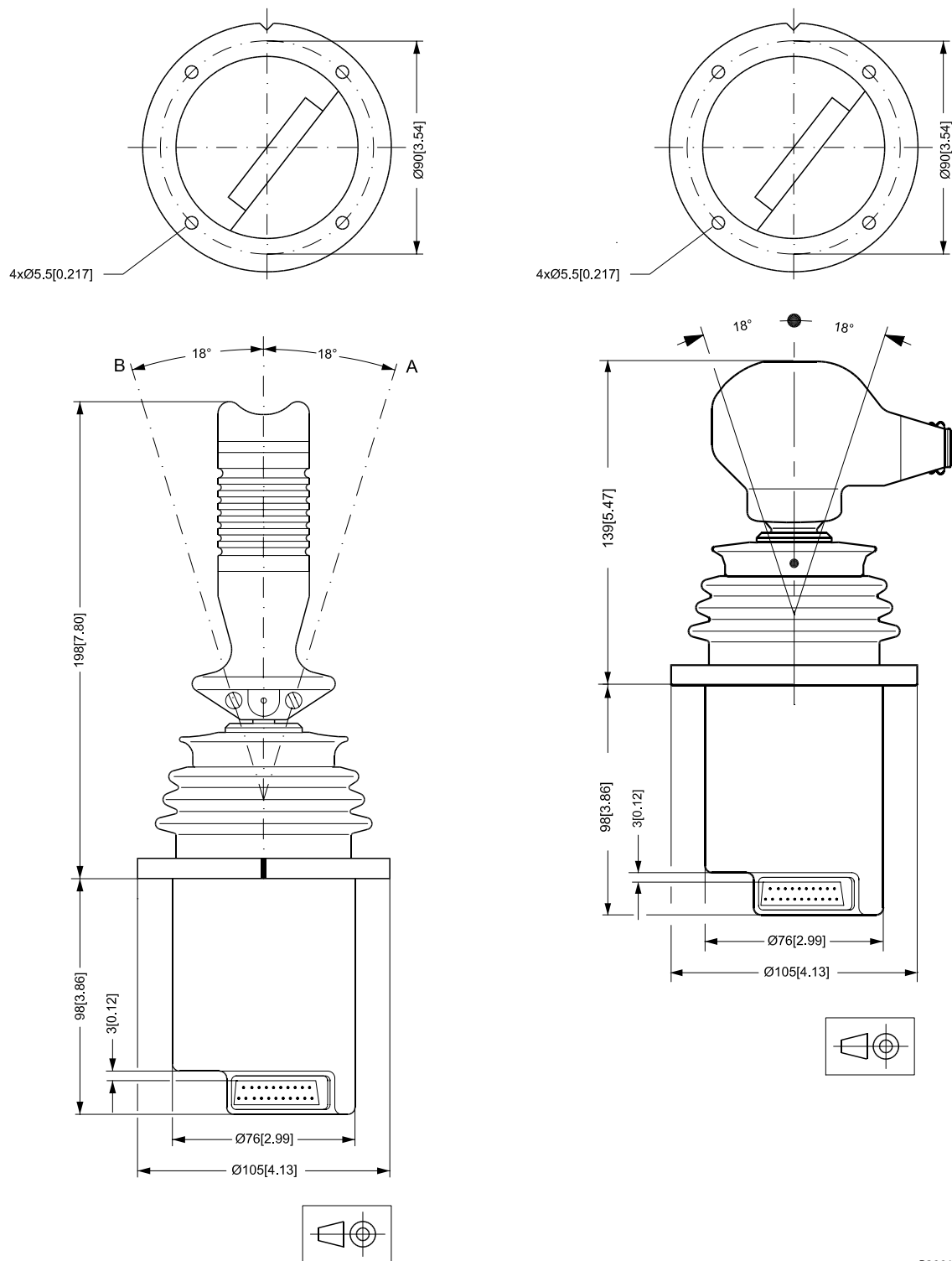
**PVRE series 2**

|                                    |                          |                                           |                          |
|------------------------------------|--------------------------|-------------------------------------------|--------------------------|
| Signal load in neutral position    | Load type                | PVE                                       | Other                    |
|                                    | Load impedance           | >6 k $\Omega$                             | >15 k $\Omega$           |
| Signal current at max movement     |                          | $U_s - 0.5 \times U_{DC}$<br>6 k $\Omega$ | $U_s$<br>15 k $\Omega$   |
|                                    | @ $U_{DC} = 12\text{ V}$ | $\pm 0.6\text{ mA}$                       | 0.2 $\rightarrow$ 0.6 mA |
|                                    | @ $U_{DC} = 24\text{ V}$ | $\pm 1.2\text{ mA}$                       | 0.4 $\rightarrow$ 1.2 mA |
| Signal current in neutral position | @ $U_{DC} = 12\text{ V}$ | $\pm 0\text{ mA}$                         | 0.4 mA                   |
|                                    | @ $U_{DC} = 24\text{ V}$ | $\pm 0\text{ mA}$                         | 0.8 mA                   |
| On/Off switch                      | Max load                 | 0.6 A                                     |                          |
| Neutral position switch            | Max load                 | 3 A                                       |                          |

## PVRE series 2

### Dimensions

*Dimension of PVRE and PVRET versions*



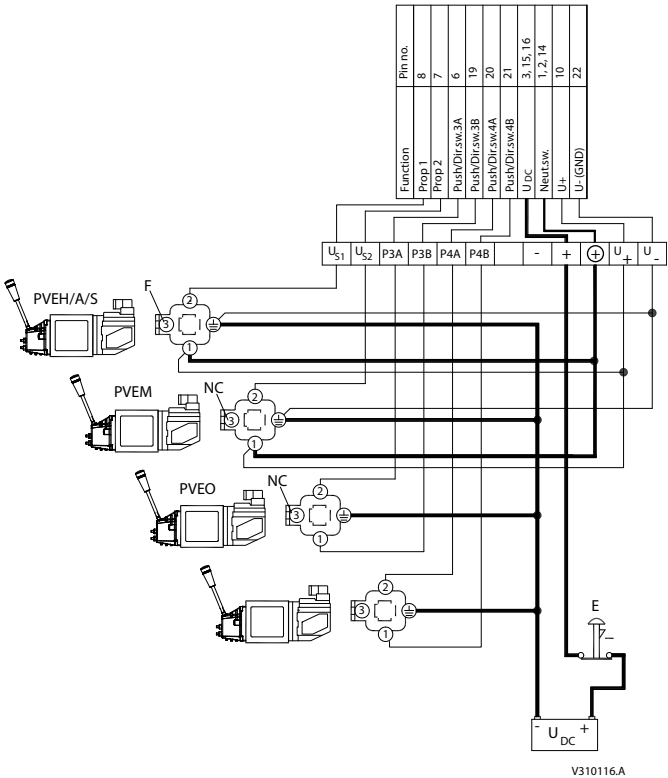
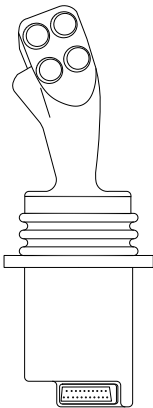
P200182

**PVRE series 2**

**Examples of Use**



155B60.10

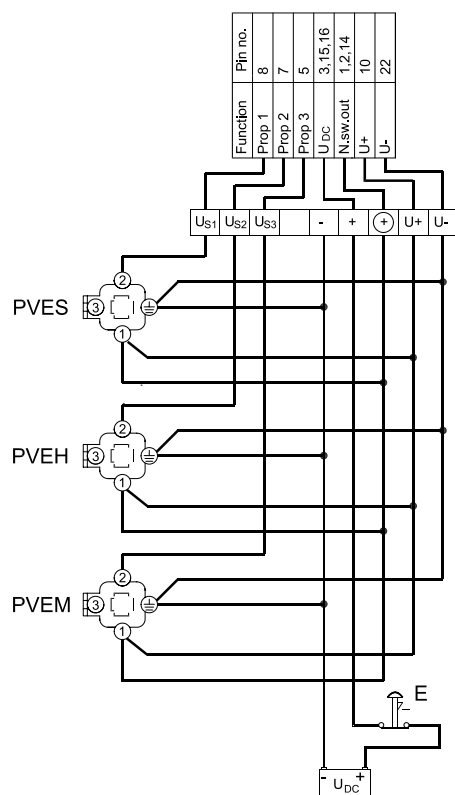
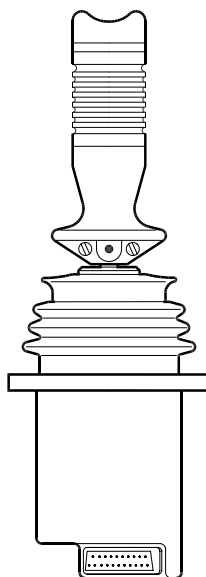


- : Emergency stop
  - : Signal leads
  - : Supply leads
- PVRET Series 2

**PVRE series 2**



155B147.10



155B540.11

**PVRE**

The diagram illustrates the wiring for a CAN bus system. It shows connections for Power Feedback (To ADC), VBat, GND, CAN HI, CAN LO, CAN Shield, Prop 1, Prop 2, Prop 3, Push 7, Push 8, and Neutral Position Switch. The diagram includes various electronic components like resistors, capacitors, and op-amp buffers.

## PVRET series 2

The PVRET series 2 is the successor to the popular PVRET joystick. This joystick builds on the known technology from the Prof family of joystick as well as the traditional handles from the PVRET series 1.

### Version

| Code no. 162F....                   | 1315<br>(1305)                                                                                  |
|-------------------------------------|-------------------------------------------------------------------------------------------------|
| Symbol                              | <br>155B532.11 |
| () Incl. PVRE series 1 adapter ring |                                                                                                 |

### PVRET version connections

### Technical Data

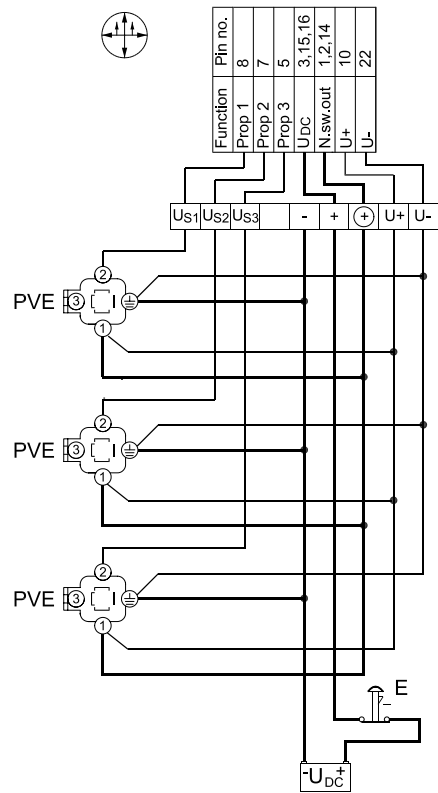
|                                    |                 |                          |                                                |                         |
|------------------------------------|-----------------|--------------------------|------------------------------------------------|-------------------------|
| Enclosure                          |                 | Below flange             | IP 21                                          |                         |
|                                    |                 | Above flange             | IP 54                                          |                         |
| Ambient temperature                |                 |                          | −30 - +60° [−22 - +140°F]                      |                         |
| Supply voltages                    |                 | U <sub>DC</sub>          | 10-30 V                                        |                         |
|                                    |                 | Max ripple               | 5%                                             |                         |
| Current consumption                |                 |                          | ≈150 mA                                        |                         |
| Signal voltage                     | U <sub>s</sub>  | Min → Max                | 0.25 → 0.75                                    |                         |
|                                    | U <sub>DC</sub> | Neutral position         | 0.50                                           |                         |
| Signal load in neutral position    |                 | Load type                | PVE                                            | Other                   |
|                                    |                 | Load impedance           | >6 kΩ                                          | >15 kΩ                  |
| Signal current at max movement     |                 |                          | U <sub>s</sub> - 0.5 × U <sub>DC</sub><br>6 kΩ | U <sub>s</sub><br>15 kΩ |
|                                    |                 | @ U <sub>DC</sub> = 12 V | ±0.6 mA                                        | 0.2 → 0.6 mA            |
|                                    |                 | @ U <sub>DC</sub> = 24 V | ±1.2 mA                                        | 0.4 → 1.2 mA            |
| Signal current in neutral position |                 | @ U <sub>DC</sub> = 12 V | ±0 mA                                          | 0.4 mA                  |
|                                    |                 | @ U <sub>DC</sub> = 24 V | ±0 mA                                          | 0.8 mA                  |
| On/Off switch                      |                 | Max load                 | 0.6 A                                          |                         |
| Neutral position switch            |                 | Max load                 | 3 A                                            |                         |

**PVRET series 2**

**PVRET version dimensions**

*Dimensions illustration here*

**Examples of Use**



155B552.10

: Emergency stop

: Signal leads

: Supply leads

**Products we offer:**

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- Hydrostatic pumps
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