

SAFETY PRODUCTS

Pluto block selection guide

ABB Jokab Safety



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1 Products

The intention of this document is to give recommendations of what kind of function blocks to be used for different products. It is assumed that ABB Jokab Safety products are being used. For an in-depth description of the blocks, please see Pluto Manager and the manuals it contains.

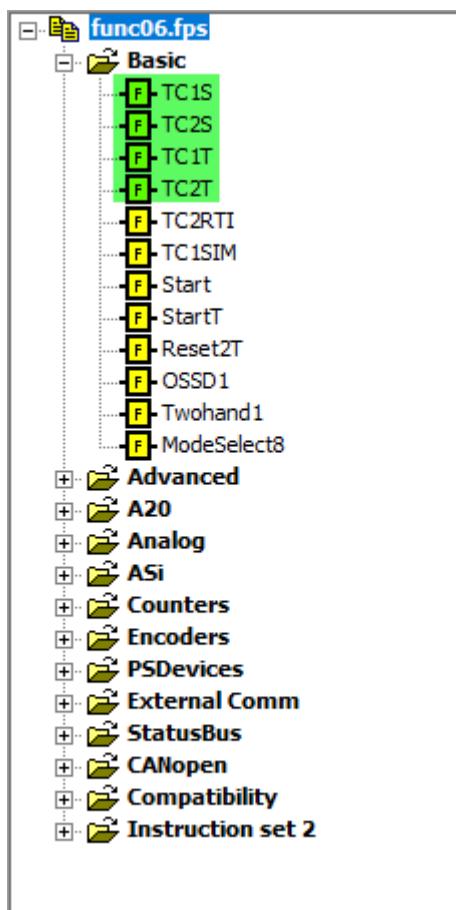
Please study the manuals for correct use and connection of the products.

1.1 Smile, Inca, EStrong, and LineStrong, emergency stops

There are two types of technologies used in the different emergency stops in the ABB Jokab Safety product range. Classic two-channel and DYNlink.

1.1.1 Classic two-channel (dual channel) emergency stops

Emergency stops realized using two dry NC-contacts.



Please note that serial connection of classic two-channel devices to two safe inputs immediately leads to a lower level of safety according to ISO 13849 due to "fault masking".

This is true both on the hardware side, and in the PLC code. Do not connect different dual channel devices in series to input pins of the block used. Either use two I-inputs, or a combination of an I-input and an IQ-input, **but not two IQ-inputs**.

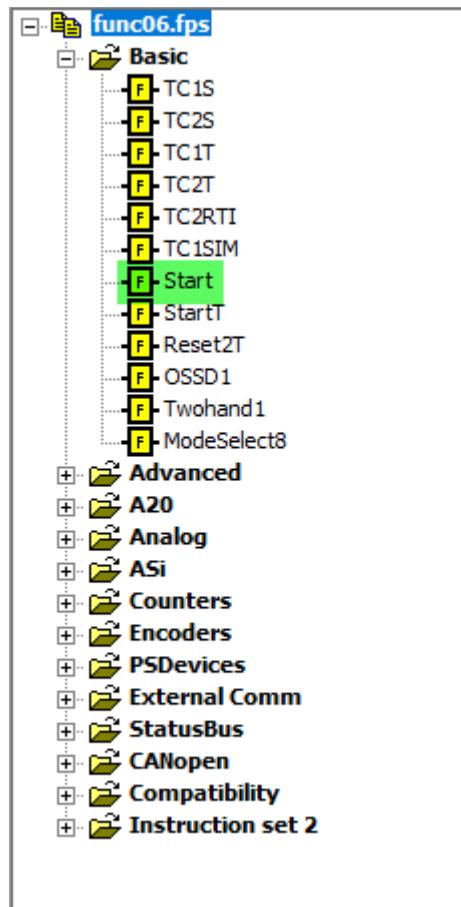
Use Tina-adaptor units on such devices to ensure the highest possible safety level when connecting them in series.

Please study the manuals for correct use and connection of the products.

1.1.2 Emergency stops realized by using DYNlink

The DYNlink solution makes it possible for some emergency stop models to be connected in series and still maintain the maximum possible safety level according to ISO 13849. Furthermore, it is easy to mix different safety devices in series, thanks to the Tina-adaptor devices. The emergency stops with the word "Tina" in them has this functionality built-in, no need for a separate Tina-device.

Technically the dynamic input is already evaluated safely when used in the Pluto unit, so a block is not really needed. However, to make it easy to spot glitches on dynamic inputs the block below can be used for monitoring purposes.



1.2 Safety sensors, switches and locks

Depending on the technology - classic two-channel (dual channel), OSSD or DYNlink - these safety functions are realized with different blocks that can be used.

Please remember that there are classic two-channel (dual channel) devices or OSSD devices that can be adapted to DYNlink by using Tina-adaptors.

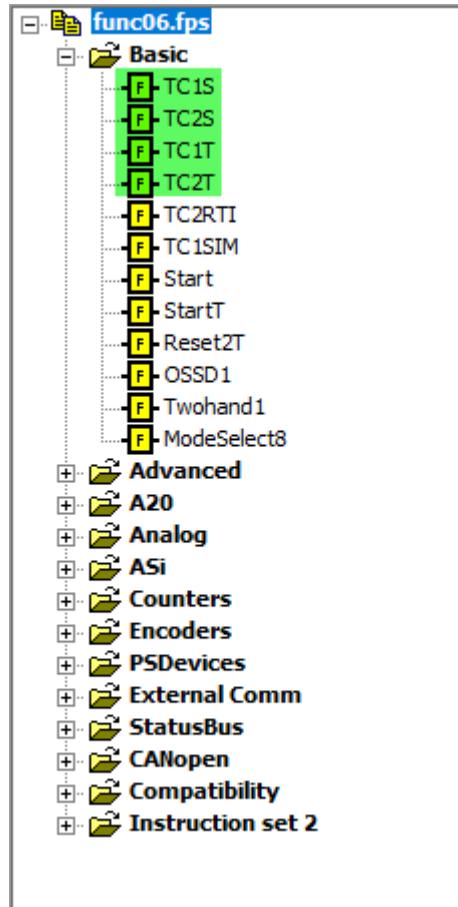
1.2.1 MKey, Sense7, GKey, sensors and switches using classic two-channel

These devices use two inputs to reach the maximum possible safety level according to ISO 13849.

The MKey safety key switch range end up here together with Sense7 and GKey.

1.2.1.1 MKey

Safety key switches.



Please note that serial connection of classic two-channel devices to two safe inputs immediately leads to a lower level of safety according to ISO 13849 due to "fault masking".

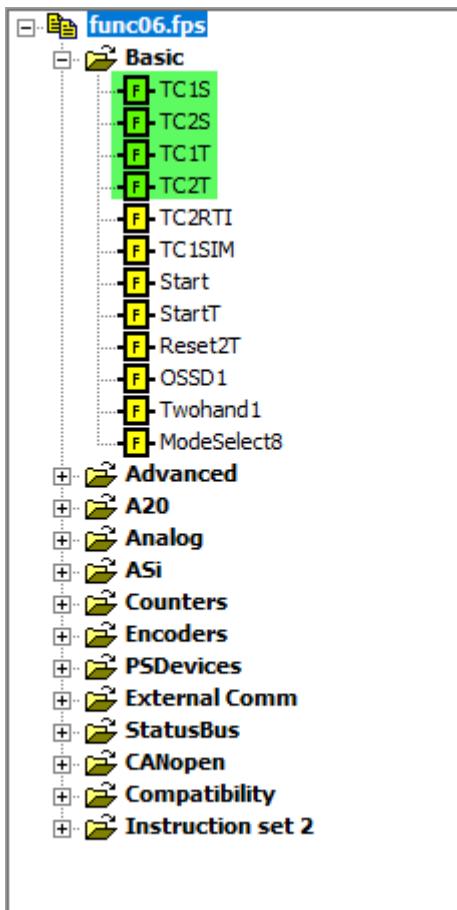
This is true both on the hardware side, and in the PLC code. Do not connect different dual channel devices in series to input pins of the block used. Either use two I-inputs, or a combination of an I-input and an IQ-input, **but not two IQ-inputs**.

Use Tina-adaptor units on such devices to ensure the highest possible safety level when connecting them in series.

Please study the manuals for correct use and connection of the products.

1.2.1.2 Sense7

Simple magnetic non-contact sensors.



Please note that serial connection of classic two-channel devices to two safe inputs immediately leads to a lower level of safety according to ISO 13849 due to "fault masking".

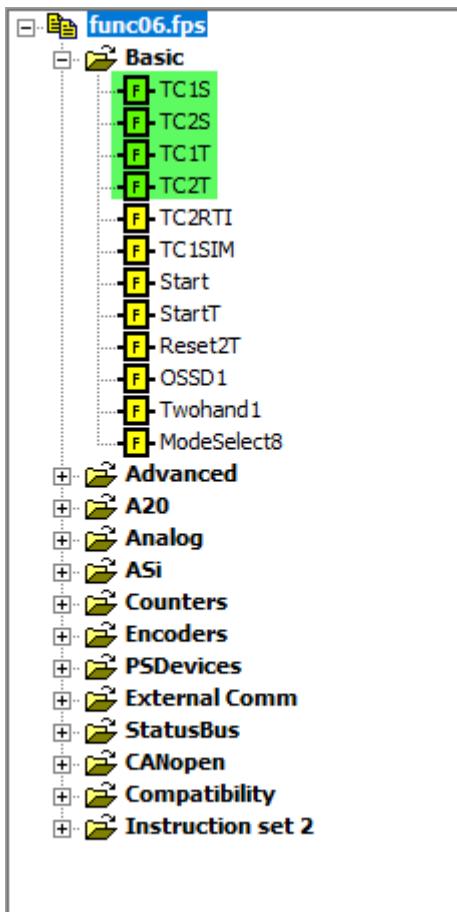
This is true both on the hardware side, and in the PLC code. Do not connect different dual channel devices in series to input pins of the block used. Either use two I-inputs, or a combination of an I-input and an IQ-input, **but not two IQ-inputs**.

Use Tina-adaptor units on such devices to ensure the highest possible safety level when connecting them in series.

Please study the manuals for correct use and connection of the products.

1.2.1.3 GKey

A mechanical safety lock. The suggested blocks are used for the interlocking safety function. There are no function blocks available for the control of the safe lock, these functions must be programmed according to the demands of the specific application.



Please note that serial connection of classic two-channel devices to two safe inputs immediately leads to a lower level of safety according to ISO 13849 due to “fault masking”.

This is true both on the hardware side, and in the PLC code. Do not connect different dual channel devices in series to input pins of the block used. Either use two I-inputs, or a combination of an I-input and an IQ-input, **but not two IQ-inputs**.

Use Tina-adaptor units on such devices to ensure the highest possible safety level when connecting them in series.

Please study the manuals for correct use and connection of the products.

1.2.2 Eden non-contact safety sensor

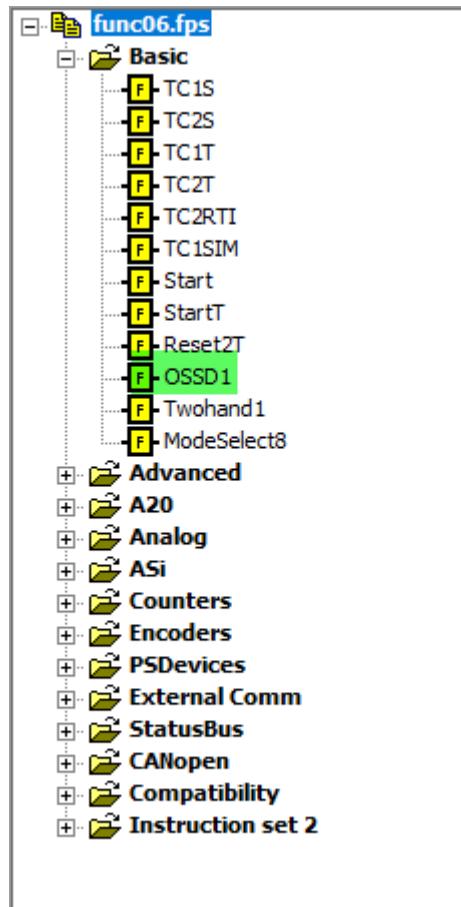
There are two different variants of the Eden sensor. One uses the OSSD technology and the other the DYNlink technology.

1.2.2.1 Eden OSSD

Thanks to the OSSD solution these can be connected in series and still maintain the maximum possible safety level according to ISO 13849. However, the two safety inputs used in the Pluto unit must still be monitored by a block.

You can use “OSSD1” but the first four “TC-blocks” under “Basic” works as well.

Please note that the block “LightGuard1” found under “Compatibility” is equivalent with “OSSD1”.

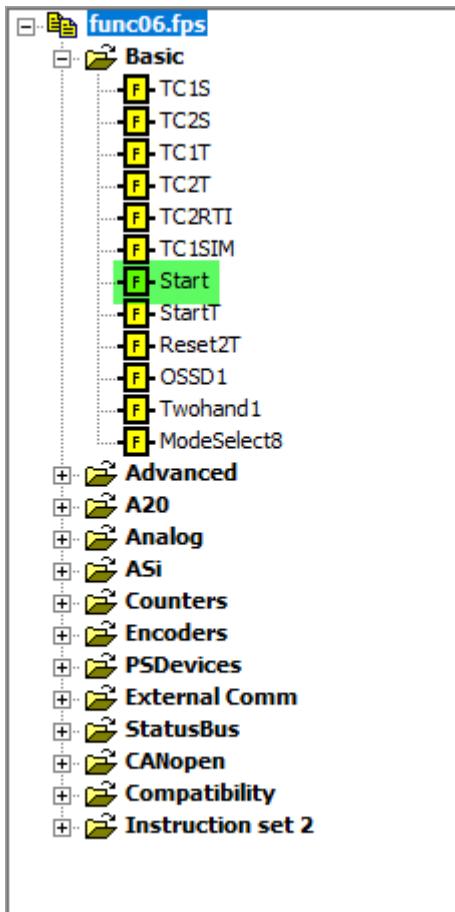


Either use two I-inputs, or a combination of an I-input and an IQ-input, **but not two IQ-inputs**.
Please study the manuals for correct use and connection of the products.

1.2.2.2 Eden DYN - DYNlink

The DYNlink solution makes it possible for Eden to be connected in series and still maintain the maximum possible safety level according to ISO 13849. Not only that, it is easy to mix different safety devices in series, thanks to the Tina-adaptor devices.

Technically the dynamic input is already evaluated safely when used in the Pluto unit, so a block is not really needed. However, to make it easy to spot glitches on dynamic inputs the below block can be used for monitoring purposes.



1.2.3 Magne

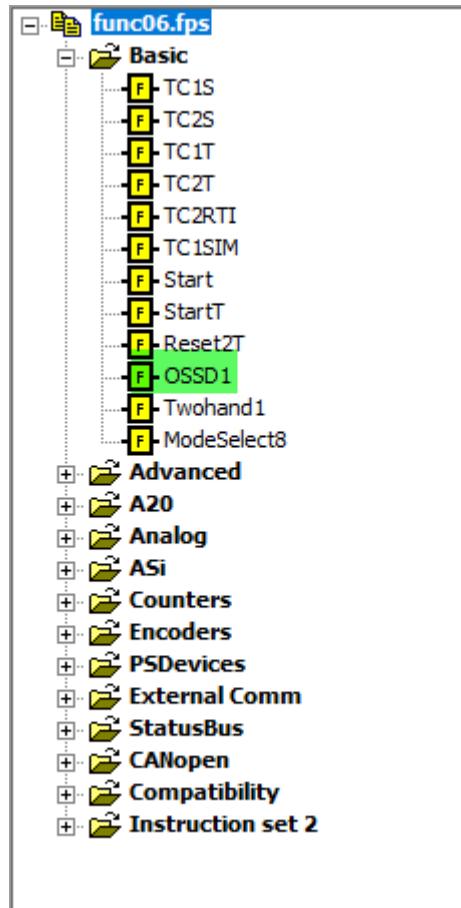
The Magne process lock is fitted with an Eden sensor internally. Just like Eden it has two different variants, an OSSD model and a DYNlink model. Hence the same blocks as for Eden are used with Magne.

The locking function is not a safety function and is not connected to the blocks used. It can be realized by separate code in the PLC project, or by some other solution.

1.3 Orion and optical safety devices

The light guard variants of Orion use OSSD technology. The two outputs from the light guard must be monitored by a block.

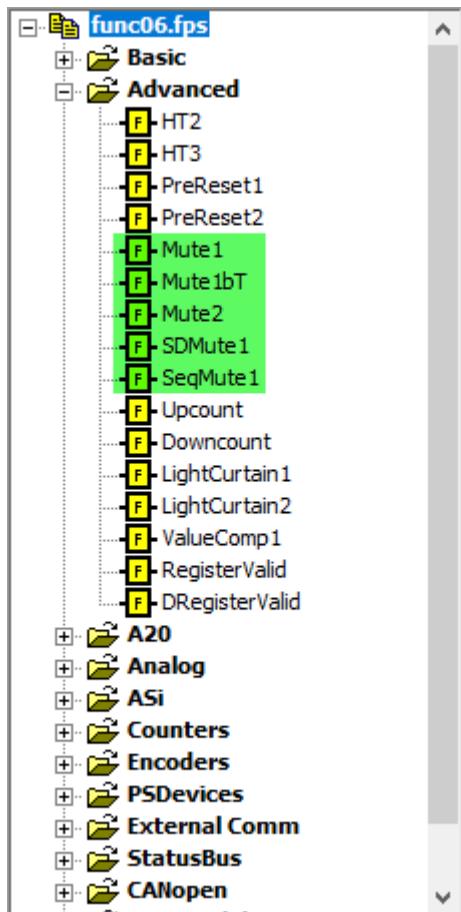
Please note that the block “LightGuard1” found under “Compatibility” is equivalent with “OSSD1”.



Either use two I-inputs, or a combination of an I-input and an IQ-input, **but not two IQ-inputs**.
Please study the manuals for correct use and connection of the products.

1.3.1 Muting realized in the Pluto unit when using an optical safety device

A muting function (temporary bypass of the light guard) doesn't have to be realized in the Orion light guard; it can be realized in the Pluto unit by using one of the following blocks.



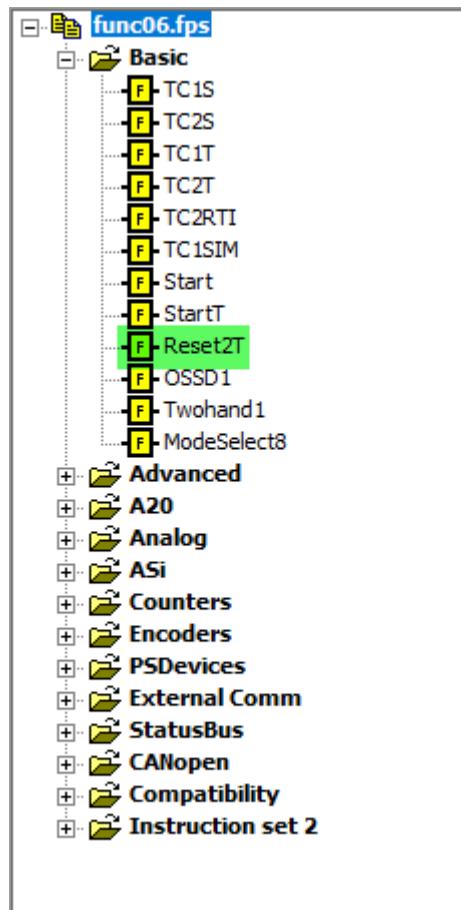
The two blocks "LightCurtain1" and "LightCurtain2" are blocks used mainly in press applications, combined with a light guard device and other sensors.

1.4 Other blocks useful to know of

Besides the blocks mentioned above a number of blocks that are useful to know of exist.

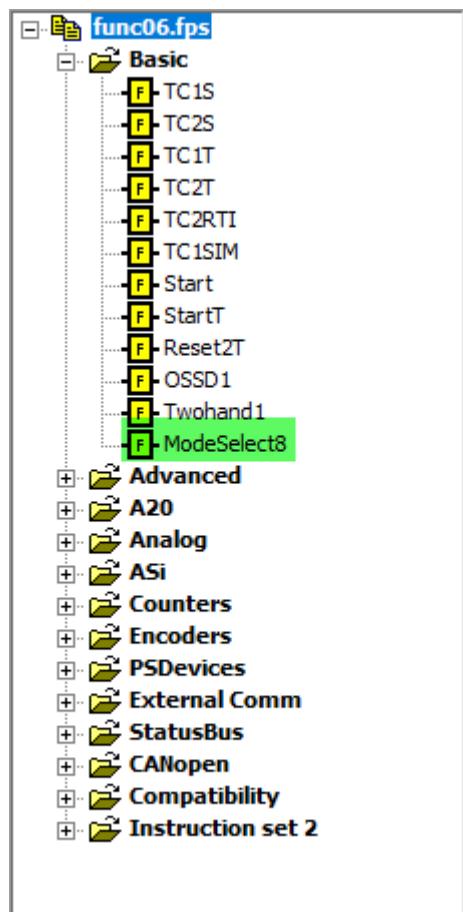
1.4.1 Monitored reset

The Reset2T block makes it easy to perform a monitored reset of a safety application. Use it together with other block's result memories (normally the Q-output) and perform the check of e.g. the feedback signal from the safety contactors. This makes it easy to comply with the requirements of the standard ISO 13849 for example.



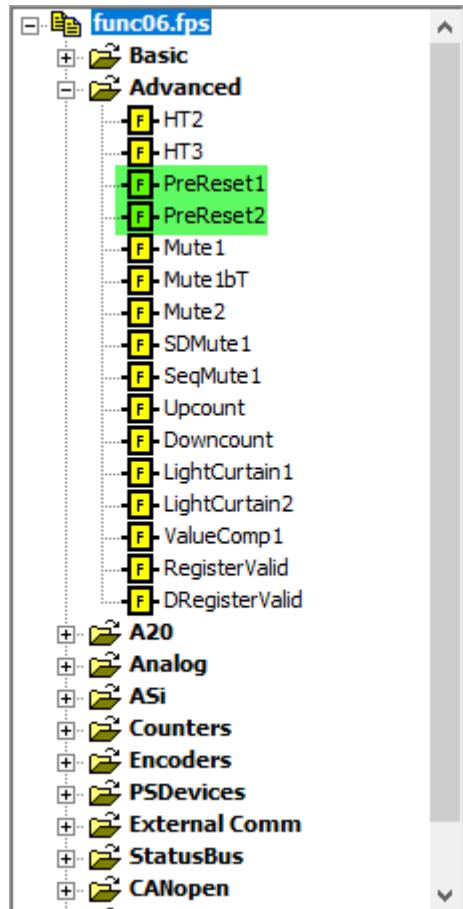
1.4.2 Mode select when using a selector switch

Use the ModeSelect8 block to ensure that only one mode is possible to use at a time.



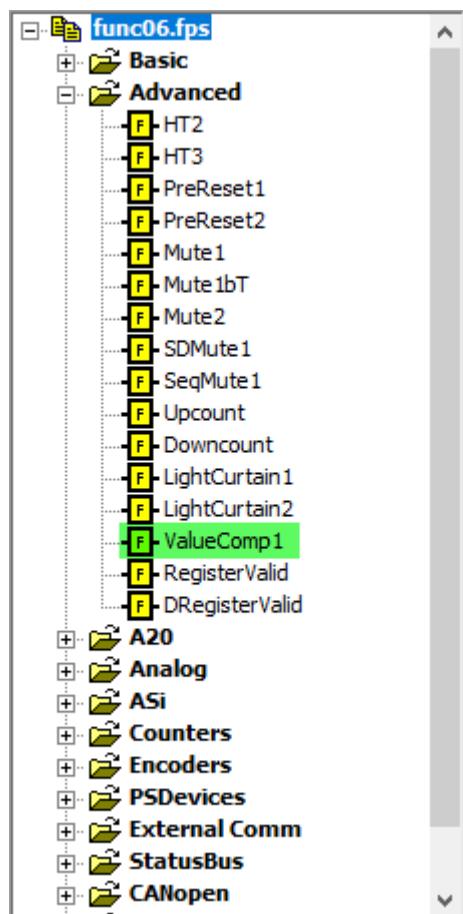
1.4.3 Pre-reset function

In some applications the whole area that is to be reset cannot be viewed because parts of it are obscured by equipment. In these applications you can ensure that the area is checked properly by placing a reset-button inside the dangerous area, then combine it with a reset button placed outside. This will force an operator to press the first button inside and get back in time to press the second, before a reset of the machine is performed.



1.4.4 Compare values and calculate a mean value

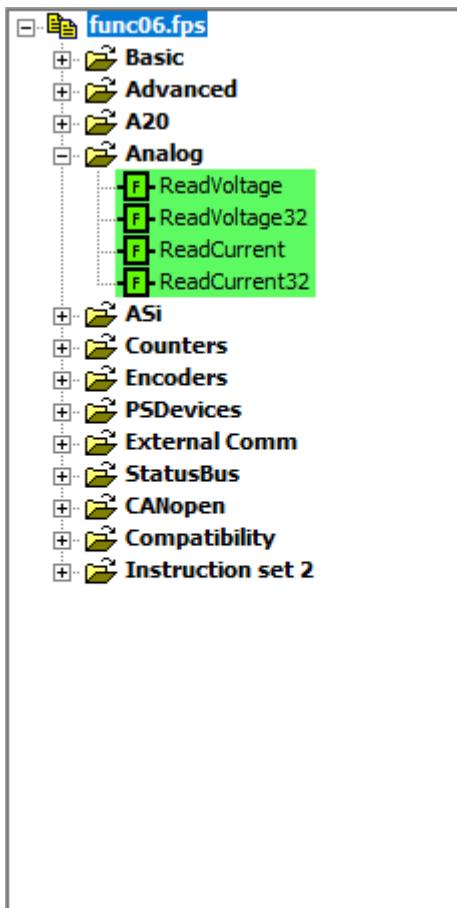
For example, in analog signal applications and applications using encoders with signals from two different sources there is a handy block. Use it to compare that the sources are within range from each other and to calculate a mean between them.



1.4.5 Pluto units with analog inputs in the 0-10 V and 4-20 mA range

The two different Pluto variants Pluto D20 and Pluto D45 are fitted with analog inputs. Use the below blocks to evaluate these inputs. Combined with the block ValueComp1 described in bullet 1.4.4 it is easy to create safe analog applications.

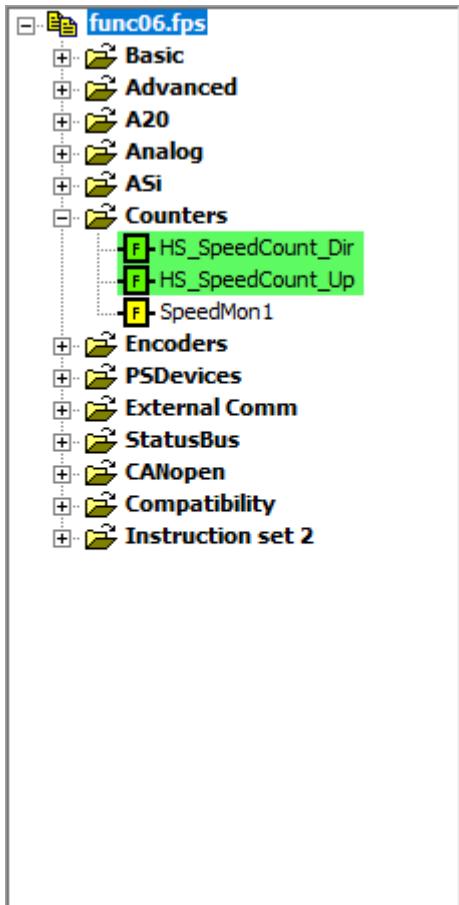
The blocks ending with “...32” are used in 32-bit register applications for a larger range than the 16-bit register can handle.



1.4.6 Speed counter inputs

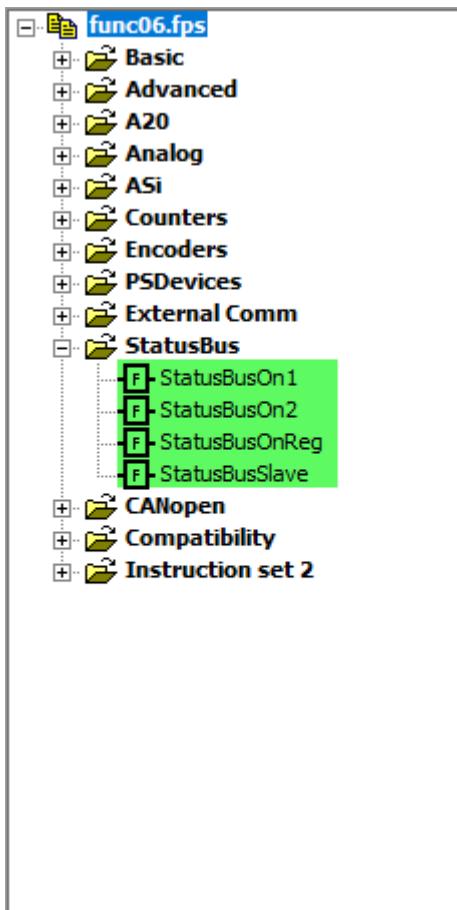
The Pluto D45 are fitted with speed counter inputs. Use the below blocks to evaluate these inputs.

The block SpeedMon1 can be used to compare a counter input with some other source, be it another counter input or for example an analog input.



1.4.7 StatusBus

Some sensors using the DYNlink solution can communicate using a StatusBus. Use this to figure out which sensor in a dynamic circuit it is that has broken the circuit.



1.5 Gateways

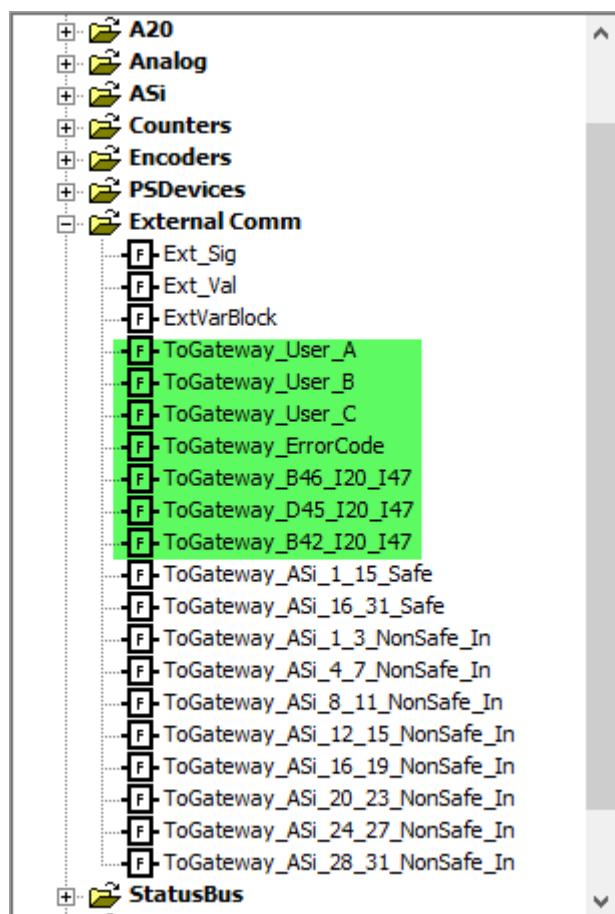
Gateways are used for communication with other systems using a fieldbus protocol.

To create solutions it is necessary to study the gateway manuals which can be found in the Help-section of Pluto Manager.

Global variables are always transmitted on the Pluto bus between units. A gateway can always listen to that traffic and pick it up without using a special block in the Pluto unit.

1.5.1 To gateway – transmitted from the Pluto unit

Blocks marked in green are the most commonly used ones.

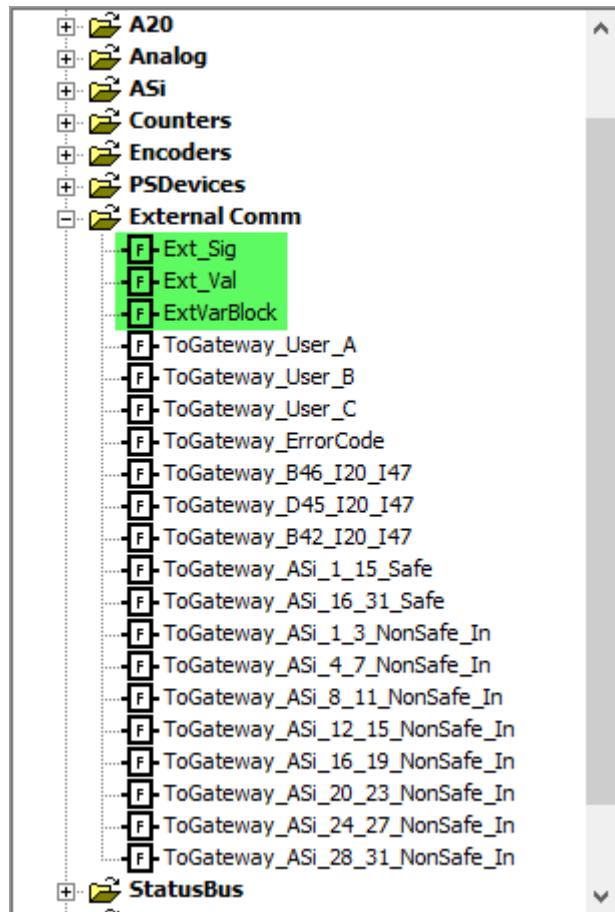


The blocks "...User_A/B/C" are used to send memories, registers and/or inputs that are not **global** (see 1.5) variables. Please note that **exported** variables must be sent to a gateway by using these blocks.

The blocks with "...B46...", "...D45..." and "...B42..." are used to send the non-global inputs of these Pluto models to the gateway. Please note that the Pluto unit's system error code is included in these blocks, so if you use these blocks there is no need to use the block "...ErrorCode".

1.5.2 From gateway - transmitted to the Pluto unit(s)

Blocks marked in green are the different blocks used to receive data from another system sent to the Pluto unit. The “ExtVarBlock” takes the input from one complete packet transmitted from the other system to the Pluto unit, that is 16 bits and two 16-bit registers.



1.6 HMI connected to the programming port of Pluto

An ABB CP600 model can easily be connected to the Pluto unit by using the unit's programming port and a cable with order code 2TLA020070R6900.

1.6.1 From Pluto unit to HMI unit

This does not require any blocks. Instead pre-calculated addresses are exported from the “Variables” tab and read into the Panel Builder 600 software and used as tags.

1.6.2 From HMI unit to Pluto unit

See 1.5.2, and remember to select “Modbus ASCII” instead of the gateway node number under “External Communication”.

1.7 Absolute encoder connected to Pluto via the Pluto bus

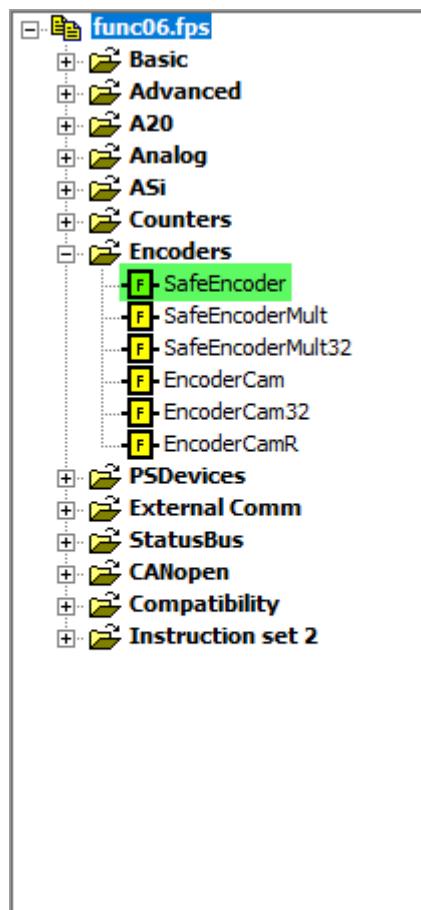
There are two types of absolute encoders used to monitor a rotating axis, to monitor speed and/or position of the axis.

A single turn encoder counts a number of increments during a single turn, and then starts from zero again.

A multi-turn encoder counts increments during a turn but continues to count after a complete revolution is done. Thus, making it possible keep track of a range and the number of turns made, and if it ends up outside that range act accordingly.

1.7.1 Single turn encoder RSA 597 and RHA 597

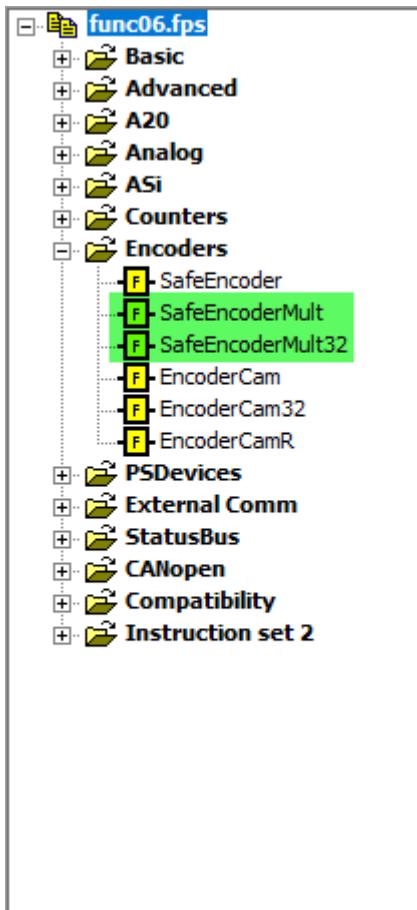
The two encoders exist in some different variants, but they all use the same block in the Pluto unit. Please note that to reach performance level "e" according to ISO 13849 they must be used in pairs, two encoder units. They are only possible to use with 16-bit register applications.



1.7.2 Multi turn encoders RSA 698 and RHA 698

The two encoders exist in some different variants. Please note that to reach performance level “e” according to ISO 13849 they must be used in pairs - two encoder units. They are possible to use both in a 16-bit register application and a 32-bit application. A 32-bit register application allows for a much greater range to be monitored.

Please note that these encoders can be configured to work as single turn encoders. If they are used as such then use the block described found in bullet 1.7.1.



1.7.3 EncoderCam, EncoderCam32, EncoderCamR

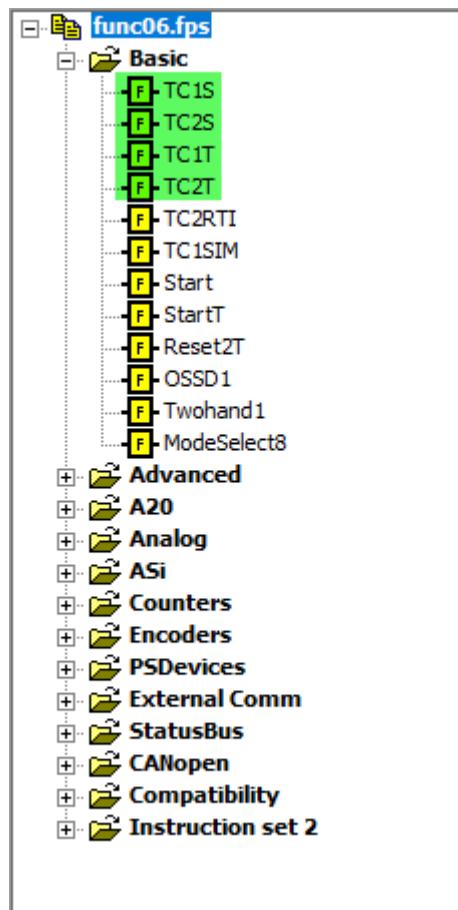
These blocks are used to monitor where in a range of increments the absolute encoders are currently pointing.

1.8 Safety control devices

There are three different safety control devices. The stand-alone Safeball, the two-hand station realized by using two Safeball, and the three-state button enabling device JSHD4.

1.8.1 Safeball – stand-alone

There are no time-requirements when using a single stand-alone Safeball, instead the physical distance from the dangerous part is longer. Use a classic two-channel (dual channel) block.



Please note that serial connection of classic two-channel devices to two safe inputs immediately leads to a lower level of safety according to ISO 13849 due to "fault masking".

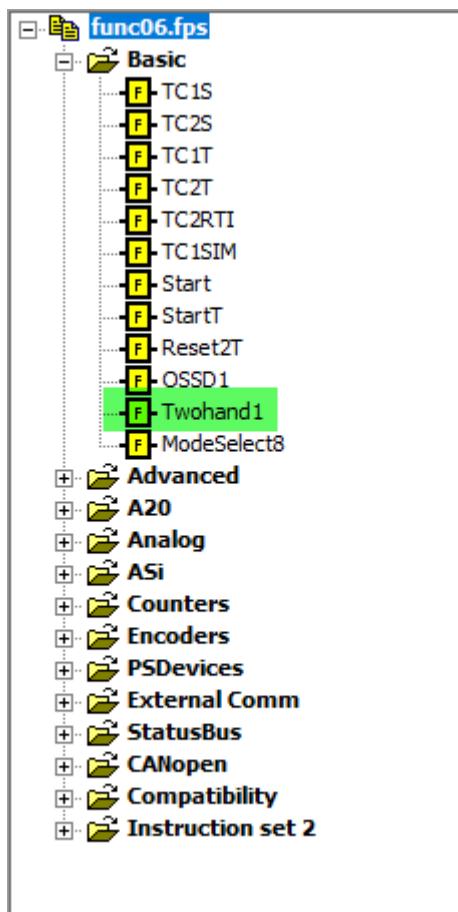
This is true both on the hardware side, and in the PLC code. Do not connect different dual channel devices in series to input pins of the block used. Either use two I-inputs, or a combination of an I-input and an IQ-input, **but not two IQ-inputs**.

Use Tina-adaptor units on such devices to ensure the highest possible safety level when connecting them in series.

Please study the manuals for correct use and connection of the products.

1.8.2 JSTD25 two-hand station realized using two Safeball

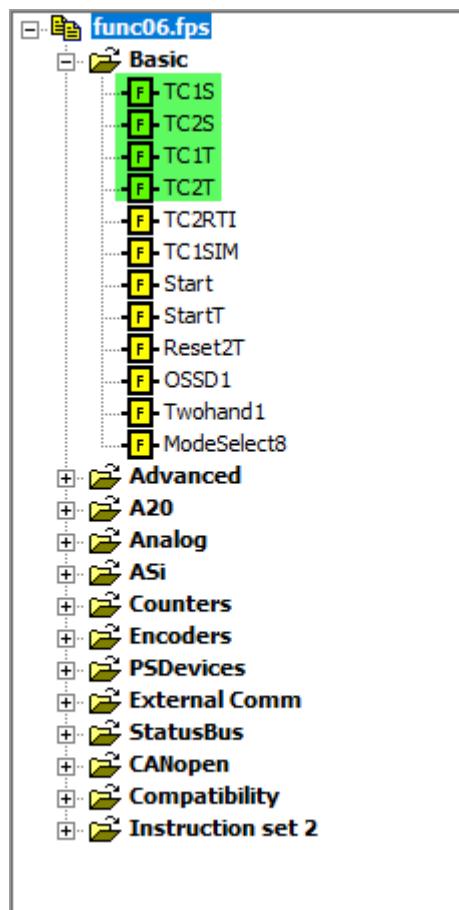
With the two-hand station JSTD25 use the below block.



Use only inputs of the I-input type, **not IQ-inputs**.
Please study the manuals for correct use and
connection of the products.

1.8.3 JSHD4 three-position enabling device

The JS HD4 comes in many different variants. All of them use classic two-channel (dual channel) technology for the three-position enabling device.



Please note that serial connection of classic two-channel devices to two safe inputs immediately leads to a lower level of safety according to ISO 13849 due to "fault masking".

This is true both on the hardware side, and in the PLC code. Do not connect different dual channel devices in series to input pins of the block used. Either use two I-inputs, or a combination of an I-input and an IQ-input, **but not two IQ-inputs**.

Use Tina-adaptor units on such devices to ensure the highest possible safety level when connecting them in series.

Please study the manuals for correct use and connection of the products.

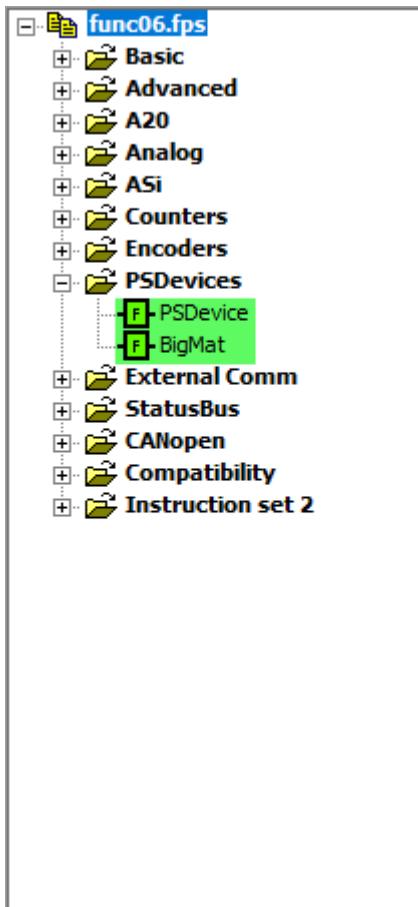
1.9 Pressure sensitive devices

There are three different types of pressure sensitive pressure devices. They are mats, bumpers and edges. All of them are connected by using a classic two-channel (dual channel) solution.

1.9.1 Mats, bumpers and edges

Please note that - **except for the BigMat block** - both channels must be realized by using two different types of the dynamic signal, for example an A-pulse and a C-pulse.

You can use the blocks below but the first four “TC-blocks” under “Basic” works as well, **except for big mats**.



Please study the manuals for the correct use and connection of each device.

1.10 CANOpen

It is possible to connect CANOpen nodes directly on the Pluto bus, and then use a Pluto unit to control the node. This is **non-safe** communication and can not be used in a safety application.

Please note that the CAN-ID's for the CANOpen nodes must not be the same as the ID's used for Pluto, gateways and encoders.

Contact your technical support for consultation before making an application with CANOpen devices.

